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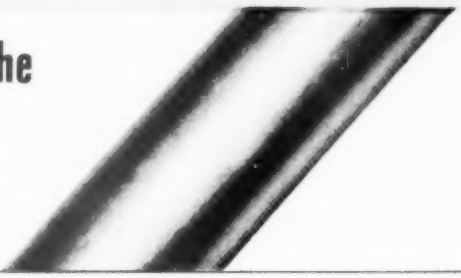

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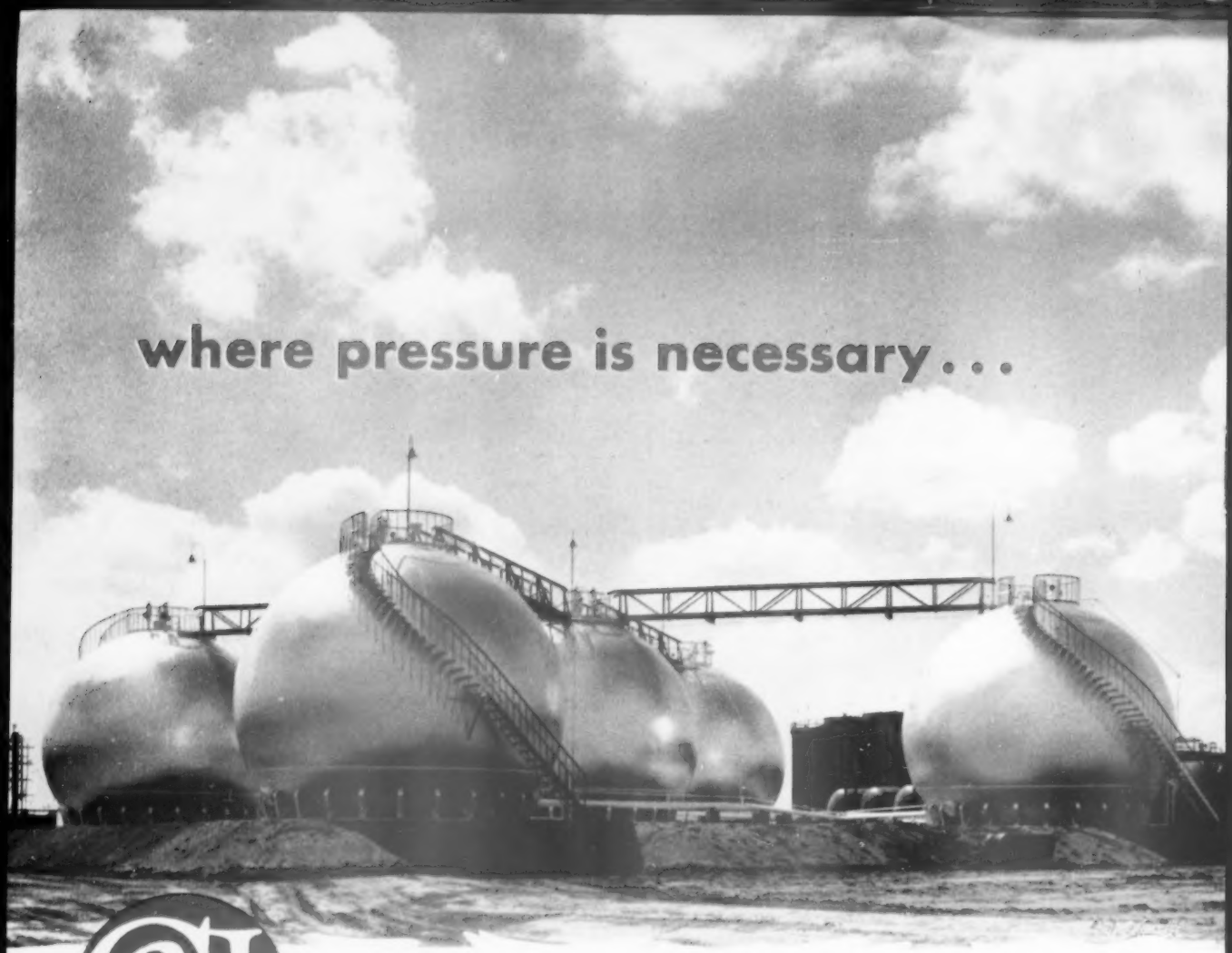

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In Brief . . .

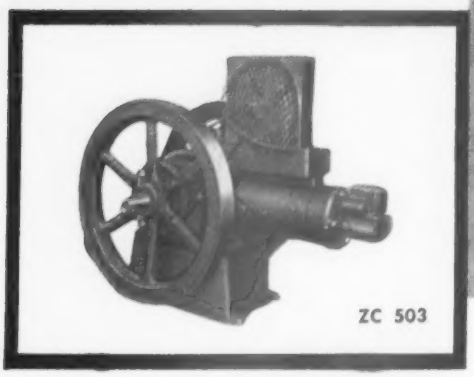
1. BETTER BLOWER OPERATION . . . Advantages for electric drivers over steam drivers for the cat cracker blower are: (1) Plant investment costs are considerably lower where steam system is inadequate and reliable electric power is available; (2) operating costs are lower in some areas; (3) maintenance costs are lower; and (4) cooling-water requirements are substantially reduced. Required service continuity can be obtained from well-designed electrical systems. Constant-speed centrifugal compressors have sufficient operating range for application.

2. FAST DRILLING . . . Fast, easy digging in soft Cretaceous shales is found when making hole in the new Doran oil field of Cheyenne County, Nebraska. In one well, only one bit was required under the surface pipe (225 ft.) to reach a depth of 4,000 ft., and this interval was cut in only 2 days.

3. ARCING HAZARD . . . Every effort should be made to keep as much as possible of a cathodic-protection cable aboveground where it is protected from inadvertent ditching. Still further protection against breakage and consequent arcing is provided by installing multiple feeders in switching systems, in rectifier connections, and in connections for multiple anode groups.

4. PETROCHEM FIELD . . . Comparatively high recovery of ethane for petrochemical feed stock is now economically attractive for a number of plants. One plant currently in operation recovers 17 per cent ethane by straight refrigeration to approximately minus 100° F. Another plant employs a two-stage absorption process, consisting of low-molecular-weight main absorption oil and high-molecular-weight oil such as kerosine to recover retrograde losses. About 35 per cent ethane is extracted at —20° F.

5. ACETONE FROM OIL . . . The Shell Saint-Gobain plant at Berre is France's first to produce acetone directly from petroleum. Raw material used is a propane-propylene stream from Shell's Berre refinery. Other ketones, alcohols, and ethers are also produced.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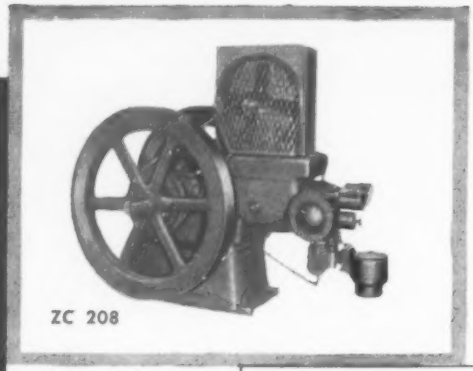
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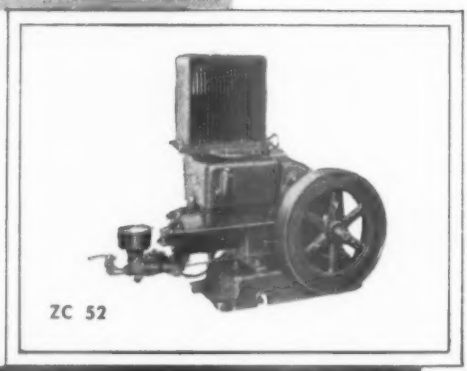
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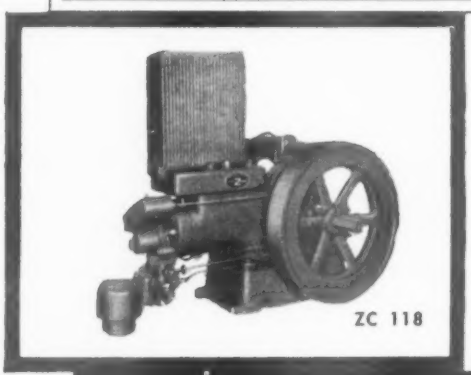
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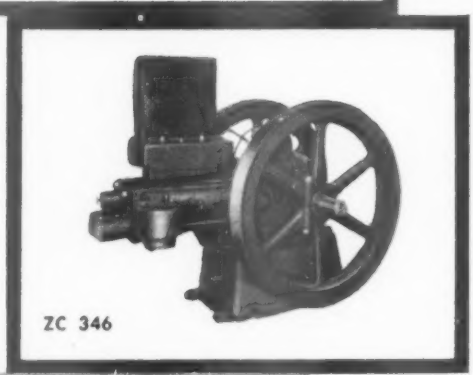
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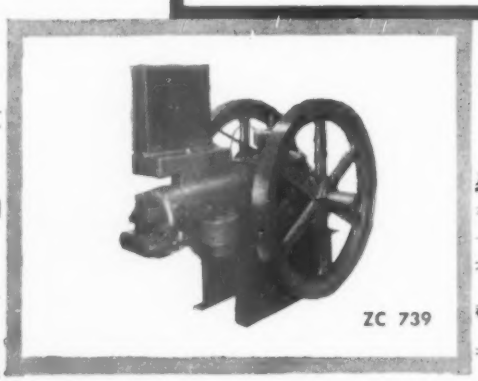
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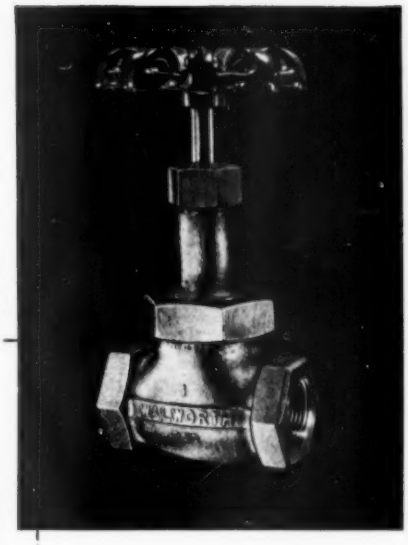

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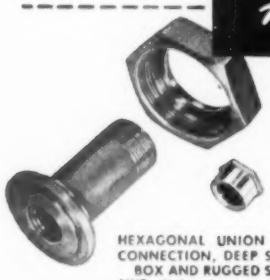

HEXAGONAL UNION BONNET CONNECTION, DEEP STUFFING BOX AND RUGGED STUFFING NUT: Union bonnet connection eliminates any chance of distortion or leakage even though valve is repeatedly taken apart and reassembled.

OVERSIZE STEM: The high-tensile strength silicon-bronze stem assures long life and protection against wear.

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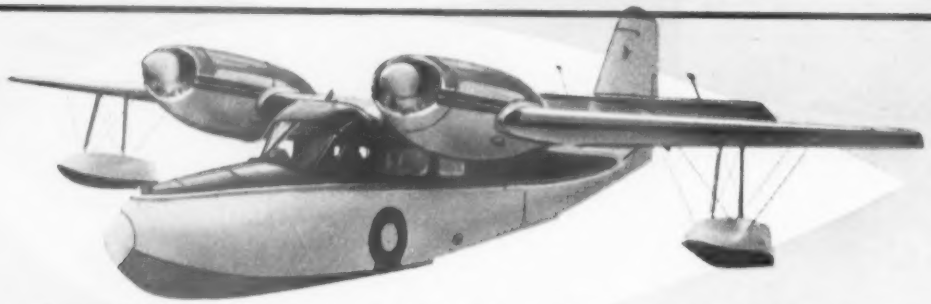

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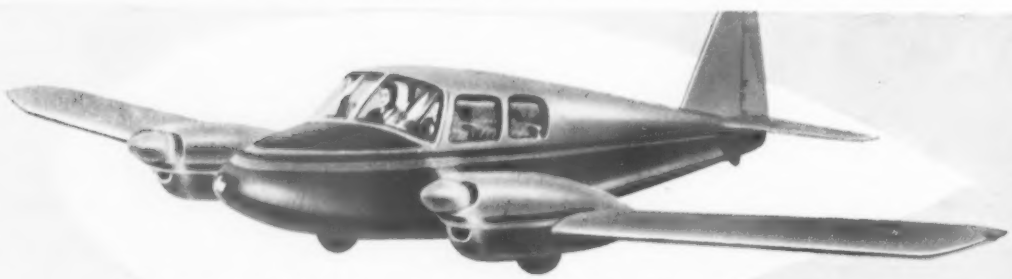

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Riley Twin Navion Conversion. 4-place executive plane powered by two 150-h.p. air-cooled Lycoming engines.

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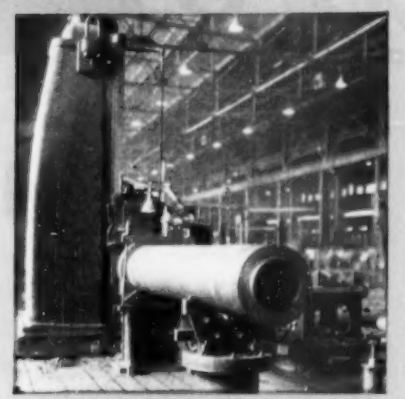

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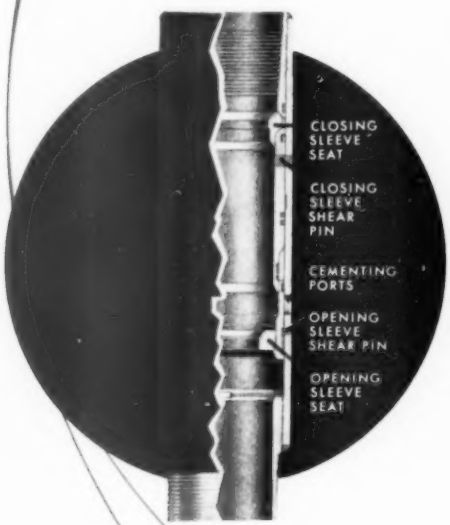

Where lower formations tend to break under cementing loads, this outstanding tool can be used to cement the lower end of the casing string. Circulation can be continued through the ports until the lower stage has set sufficiently to hold the balance of the cement column. Higher levels are then cemented as part of a multiple cement job.

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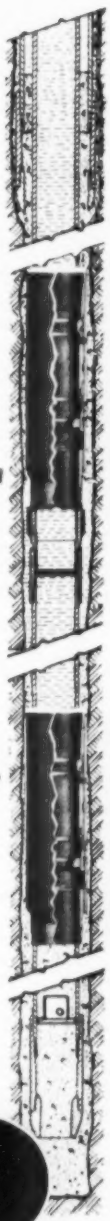

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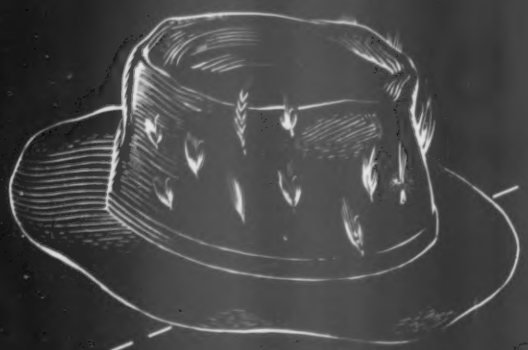

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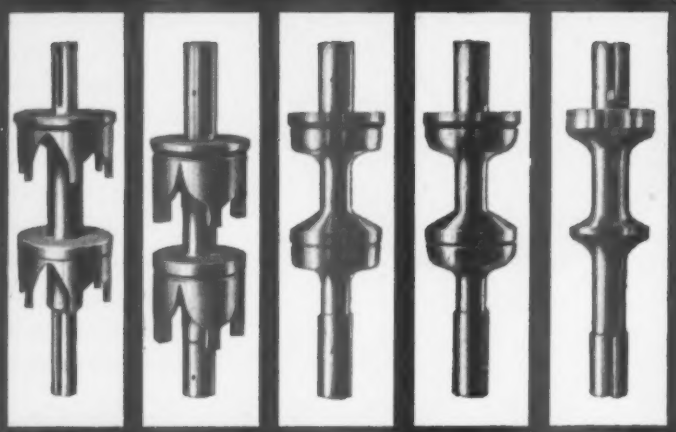

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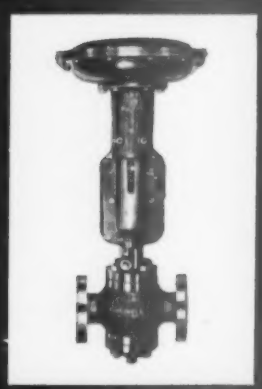

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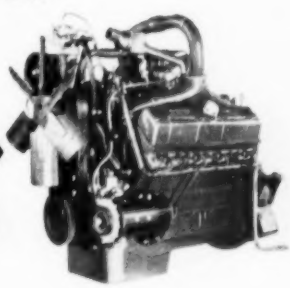
ESTABLISHED 1897

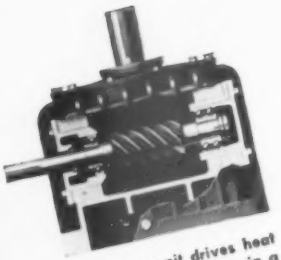
Factory Branches and Distributors from Coast to Coast in the United States and Canada. Export Division: Drexel Building, Philadelphia 6, Pa., U.S.A.



Send for the Autocar V/8 booklet

The Autocar V/8

194



CU worm gear unit drives heat exchanger cooling sulphur in a Texas gasoline processing plant. Thousands of these heavy-duty vertical drives are operating dependably in the oil and gas fields. Cleveland's friction-free performance saves power and operating costs.

CLEVELAND CU drive helps in sulphur recovery

HYDROGEN sulphide isn't lost at this Texas gasoline plant. Here this waste gas is purified and converted into sulphur. Throughout the recovery process, cooling, of course, plays an important role.

That's where the Cleveland CU worm gear speed reducer enters the picture. The Cleveland maintains the steady fan speed necessary to cool liquid sulphur to the proper temperature for efficient, maximum recovery.

The Cleveland CU drive is compact and rugged. It has a minimum number of moving parts—practically eliminating the trouble risk. It is easy to install and service in the field—in both forced and induced fan installations. Each CU unit is pretested under load and carefully checked before shipment from the factory, to insure proper adjustment, smooth operation and quietness.

Get the most for your drive dollars by writing today for new Catalog 400. The Cleveland Worm and Gear Company, 3286 East 80th Street, Cleveland 4, Ohio.

Affiliate: The Farval Corporation, Centralized Systems of Lubrication. In Canada: Peacock Brothers Limited.

Why Camco Now Uses 3 Inco Nickel Alloys

In Retrievable Gas Lift Valves

When this valve was in the testing stage it got the works . . .

And Camco discovered just what to do to assure trouble-free operation under practically any conditions.

Now they achieve an extra margin of safety by taking advantage of the distinctive properties of three Inco Nickel Alloys . . . matching the requirements for each part with the alloy best suited to meet them. Here is what Camco chose . . . and why!

Monel® for bodies, bellows, and other parts subject to the normal abuse of oil wells. Monel is a high-strength alloy with a unique record in resisting attack by sour crudes, brines and acids.

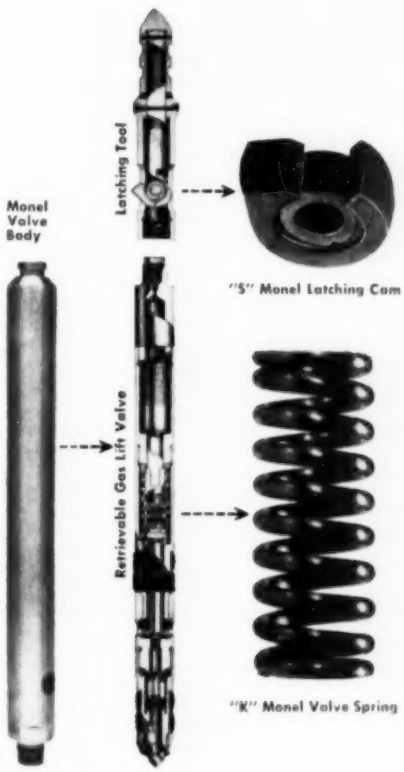
"K"® Monel for the springs. The excellent spring properties of "K" Monel, after age hardening, make it extremely useful in a wide variety of applications which require the corrosion resistance of Monel together with high elastic properties and fatigue strength. For this spring which powers part of the valve action and is the "stand-by" should the bellows fail, "K" Monel is a natural.

Cast "S"® Monel for the latching cams. "S" Monel is Monel with a portion of silicon added to provide extra hardness. A corrosion-resistant metal with great strength and high hardness was needed here since the part must not gall or seize or change shape despite years of exposure to corrosion, abrasion, shock and pull.

Let Camco's experience guide you. Use the specialized qualities built into each Inco Nickel Alloy to give your equipment a high degree of dependability.

Inco's long experience in matching metals to oil field equipment requirements is at your disposal.

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York 5, N. Y.



RETRIEVABLE . . . This unique CAMCO gas lift valve may be installed or removed *without pulling tubing.* A special tool suspended on a wire line latches valves in pockets or pulls them at will without disturbing other valves in the string. For complete information regarding Camco retrievable gas lift equipment, write directly to CAMCO, Inc., 7315 Canal St., Houston, Texas.

Inco Nickel Alloys

Monel® "K"® Monel "S"® Monel

. . . for minimum maintenance and replacement

IDEAL® HOOK BLOCKS

. . . built for safety and more efficient derrick floor handling

Keeping pace with oil-country needs in production and drilling equipment has been one of the important rules of operation throughout National Supply's fifty-nine year history of service to the petroleum industry.

As an example of meeting the needs in drilling operations, National Supply's new line of IDEAL Hook Blocks incorporates greater load capacity with minimum overall length for operating space economy and flexibility. Thoroughly field-tested and proven, the IDEAL Line of Hook Blocks brings these important design features to virtually every drilling job:

- Sheaves independently mounted on tapered roller bearings
- Individual lubrication to each sheave bearing
- All parts securely locked for safety
- Streamlined—nuts, bolts, pins and fittings completely recessed
- Shot peened alloy steel shank springs
- Hook body mounted on tapered roller thrust bearing
- Elevator link supports equipped with positive retaining links
- Automatic-latching hook tongue cannot be accidentally opened
- Spring-actuated 8-position rotation lock
- Grooved hook body facilitates elevator alignment with drill pipe

Other features and engineering specifications are covered in new bulletins on IDEAL Type "E" and Type "F" Hook Blocks. Write for your copies today.

THE NATIONAL SUPPLY COMPANY

PITTSBURGH 30, PENNSYLVANIA

DIVISION OFFICES: Denver; Ft. Worth; Houston; Pittsburgh; Tulsa; Torrance

CANADA: The National Supply Company, Ltd., 200 F. W. Clark Building, 709 Eighth Avenue, West, Calgary, Alberta

EXPORT: 600 Fifth Avenue, New York 20, N.Y., U.S.A.; River Plate House, 12 South Place, London E.C. 2

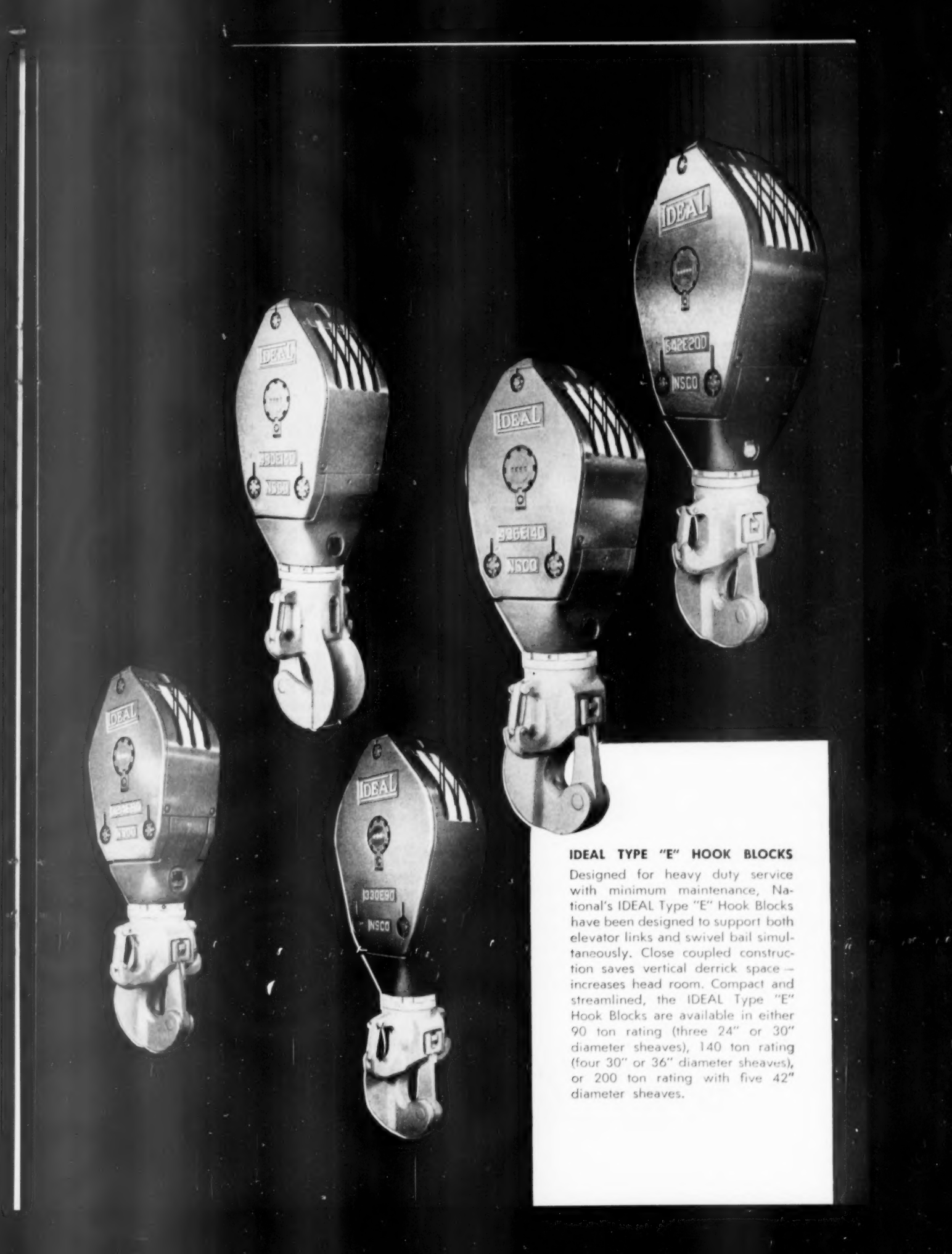
NEW HEAVY DUTY IDEAL TYPE "F" HOOK BLOCKS

Representing the accumulated results of continuing oil-country experience and advanced hook block engineering design, the new IDEAL Type "F" Hook Block provides the extra load capacity and ruggedness needed in today's deep drilling. Available in both 300 ton and 450 ton ratings, the new IDEAL Type "F" Hook Blocks carry the safety and fast handling features built into all of National's line of IDEAL Hook Blocks.

"TYPE 548F300"

NATIONAL OIL FIELD MACHINERY AND EQUIPMENT • SPANG STEEL PIPE • SUPERIOR & ATLAS ENGINES

NATIONAL BLUE PRODUCTS

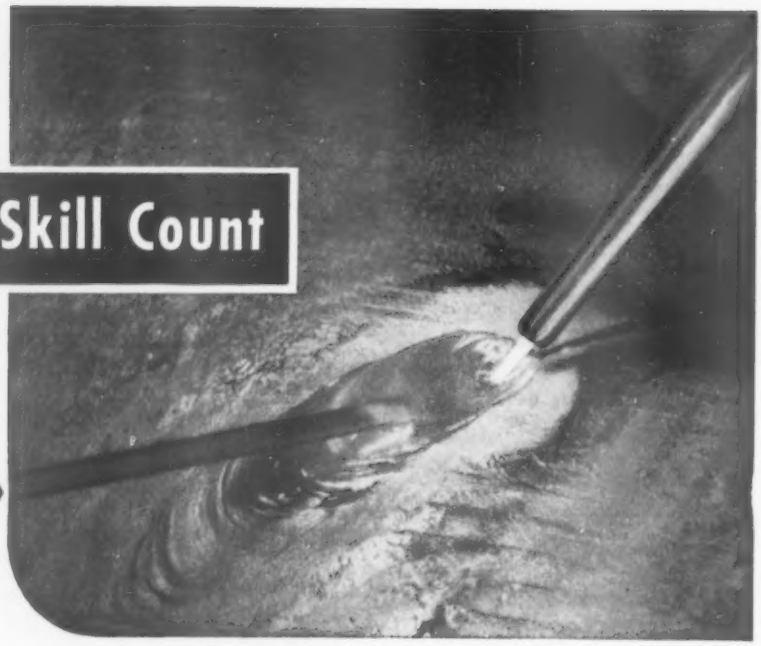


IDEAL TYPE "E" HOOK BLOCKS

Designed for heavy duty service with minimum maintenance, National's IDEAL Type "E" Hook Blocks have been designed to support both elevator links and swivel bail simultaneously. Close coupled construction saves vertical derrick space — increases head room. Compact and streamlined, the IDEAL Type "E" Hook Blocks are available in either 90 ton rating (three 24" or 30" diameter sheaves), 140 ton rating (four 30" or 36" diameter sheaves), or 200 ton rating with five 42" diameter sheaves.

Make Welding Skill Count

Use OXWELD Trade-Mark Welding Rods →



This unretouched picture shows the clean puddle formed by OXWELD *No. 1 H. T. steel rod . . . free of dirt, seams, and inclusions.*

Even the best operators must use good welding rods to make good welds. To make skill and experience count, a good welding rod is essential.

OXWELD rods insure clean, strong welds. They're developed by welding engineers who supervise every step in their manufacture. Careful testing insures that every rod measures up to OXWELD standards before it leaves the factory. And only rods that pass these rigid tests are marked with the OXWELD label.

There are OXWELD rods for steel, cast iron, wrought iron, copper, bronze, aluminum, and most alloys. Use them on your next job and notice the difference.

LINDE AIR PRODUCTS COMPANY
A Division of Union Carbide and Carbon Corporation
30 E. 42nd St., New York 17, N. Y. UCC Offices in Other Principal Cities
In Canada: DOMINION OXYGEN COMPANY, LIMITED, Toronto

All OXWELD Welding Rods
Must Pass These Rigid Tests

Chemical Analysis Test—OXWELD rods must contain specified elements in the exact amounts called for in metallurgical formulas.

Cleanliness Test—OXWELD rods must be chemically clean and free from impurities.

Flame Test—OXWELD rods must flow easily and be free of dirt, seams, and inclusions.

Welding Test—OXWELD rods must unite readily with the base metal . . . good penetration must be obtained easily.

Physical Test—OXWELD rods must measure up to the minimum requirements of tensile strength, ductility, and fatigue resistance.

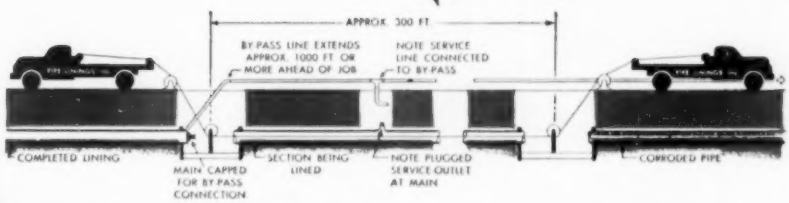
Oxweld
Trade-Mark

WELDING RODS and SUPPLIES

The term "Oxweld" is a registered trade-mark of Union Carbide and Carbon Corporation.

this ***is an Indian peace pipe...***

The American Indian knew the pleasures to be obtained from smoking long before the European world. He fashioned his crude pipe stem from cane, reed or bone and the bowl from stone, clay or hard wood. But contemporary Indian fighters who tried smoking the peace pipe reported it took a lot of lung power to draw through the rough stems. Compared to our modern pipe, smoking was hard work . . . and not the pleasant, "easy-draw" smoking pipe smokers enjoy today.


APPROX. 300 FT.
BY-PASS LINE EXTENDS APPROX. 1000 FT. OR MORE AHEAD OF JOB
NOTE SERVICE LINE CONNECTED TO BY-PASS
COMPLETED LINING
MAIN CAPPED FOR BY-PASS CONNECTION
SECTION BEING LINED
NOTE PLUGGED SERVICE OUTLET AT MAIN
CORRODED PIPE

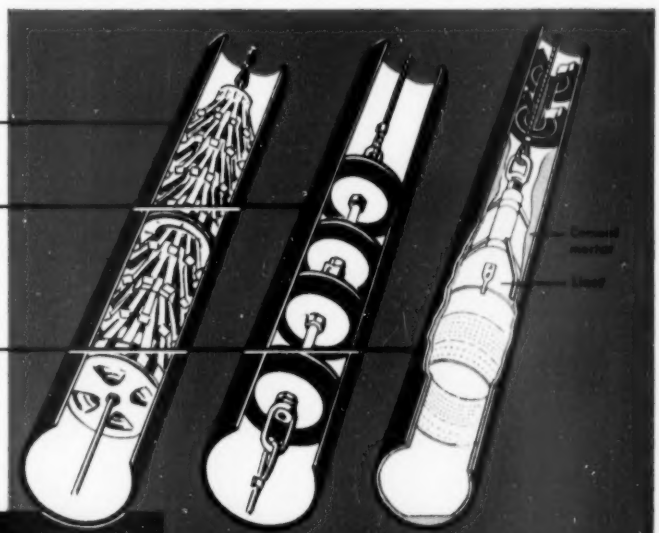
this ***is a pipe lining operation...***

. . . applicable to water, oil or gas pipe lines. . . using the Tate Process to renew old iron and steel pipe "*in place*," up to 16" dia., with only temporary interruption of service while by-pass sections are installed.

this *is the steel scraper* . . . pulled through the pipe to dislodge all tubercles and incrustation.

this *is the rubber swabber* . . . drawn through the pipe after the scraping operation to make sure pipe is clean and smooth and all loosened material is removed.

this *is the Tate Process liner* . . . it squeezes cement mortar inside onto the pipe walls, making a smooth, continuous water proof lining for free, fast flow.



When your underground pipe line looks like this

The Tate Process makes it look like this!

CEMENT MORTAR LINING GIVES YOU

- New pipe performance!
- Restores flow coefficients!
- Reduces pumping and maintenance costs!
- Prevents leakage!
- Protects against corrosion, contamination and discoloration!
- At much less than the cost of installing new pipe!

Pipe Linings, Inc. offers "*in place*" Tate Process lining service for pipe 4" to 16" and "*in place*" Centriline Process lining service for pipe 16" to 144". Expert, trained crews. Complete mobile equipment and facilities.

A Pipe Linings hydraulic engineer will be glad to help you. No obligation!

Write today for details on handy coupon.

PIPE LININGS, Inc., 4675 Firestone Blvd., South Gate, California

( ) Please send complete information on how to obtain new pipe line performance from our old pipe.

( ) Please have one of your hydraulic engineers see me.

Name _____

Title _____

Company _____

Address _____

City _____ State _____

PIPE LININGS, Inc.

4675 Firestone Blvd., South Gate, California

(A subsidiary of American Pipe and Construction Co.)

Case No. 64

Kemp Dryer
Assures Accuracy
For Sun Oil Co.

How SUNOCO® guarantees dependable instrument readings 24 hours a day

WHEN the Sunoco Plant at Marcus Hook, Pa., introduced a new process at the beginning of the year, many new instruments were installed. To dry the compressed air operating these instruments and assure accurate readings, Sunoco installed a Kemp Model 300 S Dryer

Kemp Dryer Entirely Satisfactory

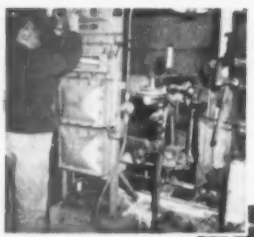
According to Harold Powers, Instrument Supervisor at Sunoco, the Kemp Dryer has been entirely satisfactory in performance. Operating continuously day and night since installation, it has performed according to specifications, has never been saturated, and has required very little attention.

Kemp Dryers for Every Purpose

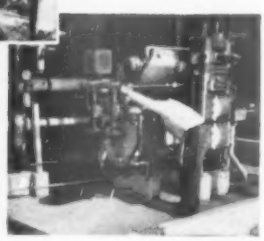
Kemp offers a variety of dryer models to meet all problems. Designed to dry air to sub-zero dew points at low cost, they are constructed of quality materials and embody the engineering knowledge gained from Kemp's many years of experience. They are available with manual, semi-automatic, or fully automatic tower reactivation. In addition, Kemp will prescribe the proper desiccant for each specific drying job. If you have a problem involving the removal of water from air, gases, or liquids, contact Kemp engineer now.

KEMP INERT GAS GENERATORS, too, serve Sunoco well

Sunoco reports that its two Kemp Inert Gas Generators have given highly satisfactory service. They are easy to start, and then operate automatically, requiring little attention. Both deliver high volume of gas of the proper analysis regardless of demand.



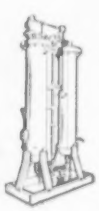
Kemp Inert Gas Generator Model C-5 MIHE. Delivers N_2 and CO_2 used to blanket top of wax tank.



Kemp Inert Gas Generator Model 8 MIHE. Produces N_2 and CO_2 for blanketing and for bubbler systems. Located in the open.

For more complete facts and technical information, write for Bulletin D-27 to:
THE C. M. KEMP MFG. CO., 405 East Oliver Street, Baltimore 2, Md.

KEMP OF BALTIMORE



DYNAMIC DRYERS

CARBURETORS • BURNERS • FIRE CHECKS
METAL MELTING UNITS • INERT GAS GENERATORS
SINGEING EQUIPMENT

The burning question

What happens when a charge of gasoline vapor is ignited in an automobile engine? What chemical compounds are formed and broken down, what complicated reactions take place as atoms and molecules perform their dance of heat and pressure and power?

Today nobody truly knows. But until this "burning" question is answered, there is an inevitable ceiling on improvements in fuels and engine design. So research laboratories all over America are hard at work on the problems of combustion.

At Ethyl's Detroit laboratories a team of chemists and engineers have specialized on this basic research in combustion for a number of years. In their attacks

(continued on next page)

Printed in U.S.A.

The burning question

(Continued from preceding page)

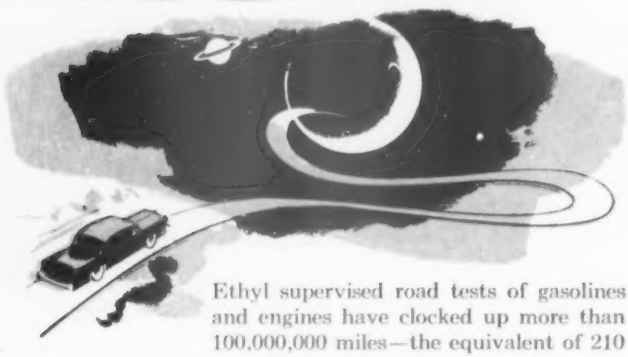
on the problem, they have developed special instruments for measuring pressures and temperature—and for sampling of the mixture in the cylinder. They have devised new types of laboratory tests, and already many new facts have been obtained—which we have passed along to the petroleum and automotive industries.

Also, because of Ethyl's unique association with the petroleum and automotive industries, we have been able to participate in cooperative programs with both of them. For here is a problem—or rather a collection of problems—that is a match for the combined efforts of a vast number of researchers.

Someday we will all know what goes on during combustion. It is a dream worth working for. But until that day comes, Ethyl laboratories will continue its intensive research on "the burning question," and supply you the answers as they are found.

ETHYL CORPORATION
NEW YORK 17, NEW YORK

WORTH NOTING



Ethyl supervised road tests of gasolines and engines have clocked up more than 100,000,000 miles—the equivalent of 210 round trips to the moon.

Since 1945 Ethyl has distributed nearly 5,000,000 dealer-education pieces to service station dealers and oil company personnel to help them sell more of your best fuel.

Ethyl's research people alone have a combined antiknock experience of 5232 years. For one man to have all this experience he would have to have lived nearly six times as long as Methuselah.

Ethyl Service is backed by 30 years of antiknock experience

For a dependable source of pipe and tubing—

Remember... call TEX-TUBE first

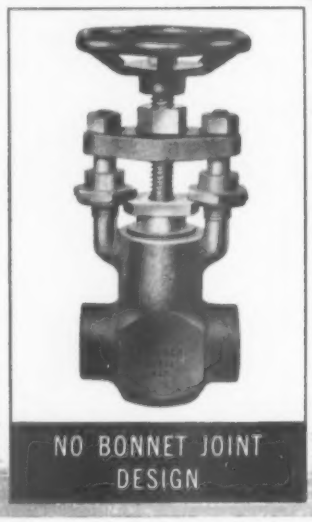
Tex-Tube has a complete stock of pipe and tubing for all industries on hand at all times. This new crane runway, installed recently at Tex-Tube's yards, speeds up handling and delivery of pipe.

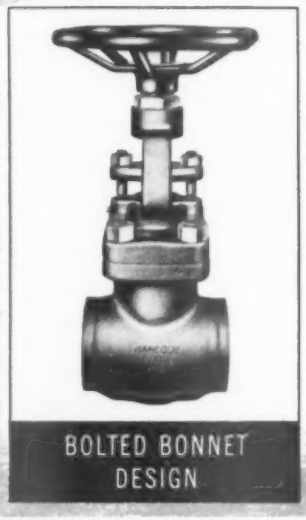
Another step in Tex-Tube's progress to leadership in the pipe supply field.

TEX-TUBE INC.

1504 OLIVER ST. • CH-6411 • HOUSTON, TEXAS

Choose THE TYPE YOU LIKE BEST





800# GENERAL PURPOSE
HANCOCK STEEL GATE WELDVALVES

Extra years of trouble-free dependability. Long-life economy. 800# Hancock Steel Gate Weldvalves give you both. Select either "no bonnet joint" or bolted bonnet design — incorporated in them are exclusive construction and operational features that have proved their value in the severest services. Yet they cost no more than ordinary valves.

Among the many superiorities built into these valves are:

1. Maximum use of super-strong, leak-proof welding.

2. Integral Stellite seats.

3. "500 Brinell" stainless steel wedges.

4. No galling because dissimilar materials are used for the accurately finished and perfectly aligned seats and wedges.

5. No stem pitting.

6. Corrosion-resisting back seating.

7. Extra-strong upper structure.

8. Repacking ease.

9. Safe, comfortable handwheel — designed to operator specifications.

10. Complete interchangeability of parts that saves time, trouble, money.

11. Baked enamel exterior finish for maximum protection.

SIZES: *No Bonnet Joint Design*—¼" through 2". *Bolted Bonnet Design*—1¼" through 2".

CONNECTIONS: Screwed ends . . . socket weld ends . . . flanged ends.

SERVICE RATINGS: For *all* pressures up to 800 psi at 750° F.—O.W.G. 2000# 100° F.

Hancock Steel Gate Weldvalves do a job and stay on the job. Complete information about the type you like best is available through your Hancock Valve Distributor. Get in touch with him today.

MANY ADVANTAGES ARE YOURS through the complete services of your Industrial Distributor. He anticipates your needs—maintains stocks of many top-quality items —saves time and money for you with fast deliveries in emergencies.

When Hancocks go in, valve costs go down.

HANCOCK VALVES

A product of **MANNING, MAXWELL & MOORE, INC.** WATERTOWN 72, MASSACHUSETTS

MAKERS OF 'HANCOCK' VALVES, 'ASHCROFT' GAUGES, 'AMERICAN' INDUSTRIAL INSTRUMENTS, 'CONSOLIDATED' SAFETY AND RELIEF VALVES, BUILDERS OF "SHAW-BOX" AND 'LOAD LIFTER' CRANES, 'BUDGIT' AND 'LOAD LIFTER' HOISTS AND OTHER LIFTING SPECIALTIES.

HOT OR COLD . . .

For a full range of
engine operation . . .
a full range of
SANTOLUBE Oil Additives

Santolube additives can be blended with your base stocks to help them meet requirements of "hot" engine operation of trucks and heavy duty equipment, or "cold" engine operation of passenger car service—or both.

This is just one of the ways in which Monsanto Santolubes can help. Other Santolubes have been specifically developed to fight corrosion, inhibit oxidation, keep engines clean and reduce engine wear.

Santolube: Reg. U. S. Pat. Off.

SANTOLUBE

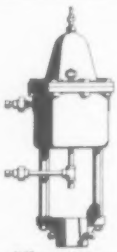
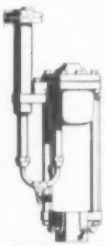
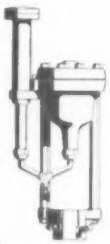
MONSANTO
CHEMICALS – PLASTICS

SERVING INDUSTRY . . . WHICH SERVES MANKIND

Like to know more about Santolube oil additives? Write for information to MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 800 North Twelfth Boulevard, St. Louis 1, Missouri.

What's worth metering is worth metering right!

. . . and Foxboro offers the *right* meter for any metering problem. Round and rectangular cases. See the varied types below.

TYPE 22 Meter Body	TYPE 29	TYPE 27 Meter Body	TYPE 28 Meter Body	TYPE 26 Meter Body
				
light weight and low cost, preferred for portable recording, or with 6" indicator, for mounting directly on piping.	for differential ranges as low as 1" H_2O, especially for low pressure gas and air service.	superior general use meter with all Foxboro design features for high sustained accuracy and maintenance-freedom.	longer float travel, greater power, highest accuracy meter ever built.	leakproof measurement at really high pressures without compromise in accuracy.

a flow meter type for every need

From its complete line of flow meters, Foxboro can offer the *best* type — in the proper range and static pressure rating — for virtually any metering problem. They are available as indicators, recorders, controllers, and transmitters — with or without integrator. Foxboro also is the maker of the d/p Cell — the compact force-balance type flow transmitter which uses no mercury.

The widest selection of flow instruments is only one of the many factors responsible for Foxboro's acknowledged leadership in flow metering. See how this factor — together with many superior, exclusive design features — give you the most value for your money. Write for Bulletin 460 on mercury meters, Bulletin 420-1 in d/p Cells.

Specifications of Foxboro Meter Types Illustrated

TYPE	MATERIAL	MAX. W. P.	RANGES
22	Forged Steel	2000	20"—200"
29	Cast Iron	150	1" —10"
27*	Forged Steel	2000	10"—400"
28	Forged Steel	2000	50"—400"
26	Forged Steel	5000	100"—400"
d/p Cell	316 S.S.	750-4000	25"—800"

*Type 27U is a uniform flow scale meter used for steam and other service where demand fluctuates widely. 100" range. Max. W. P. 2000 psi.

THE FOXBORO COMPANY, 609 NEPONSET AVENUE, FOXBORO, MASS., U.S.A.

FOXBORO FLOW METERS

REG. U. S. PAT. OFF.

FACTORIES IN THE UNITED STATES, CANADA, AND ENGLAND

Get the most from that well with

PRECISION PUMPING!

When a well is ready for the pump, the enthusiastic co-operation of your J&L store is based on the precision with which that well can be Axelson equipped.

An Axelson pump, especially equipped to handle the work in your particular well, will give the utmost in satisfactory performance. Axelson pumps are highly versatile and your J&L store personnel understands their application.

Wells present varied problems in rod selection and installation. Here again your J&L store can be very helpful. Solutions to all such problems are labeled Axelson.

Call your J&L store before you equip that well. Precision pumping pays.

J&L pump repair shops have made this a legend: NEVER JUNK AN AXELSON.

AXELSON *Chosen first ... to last!*

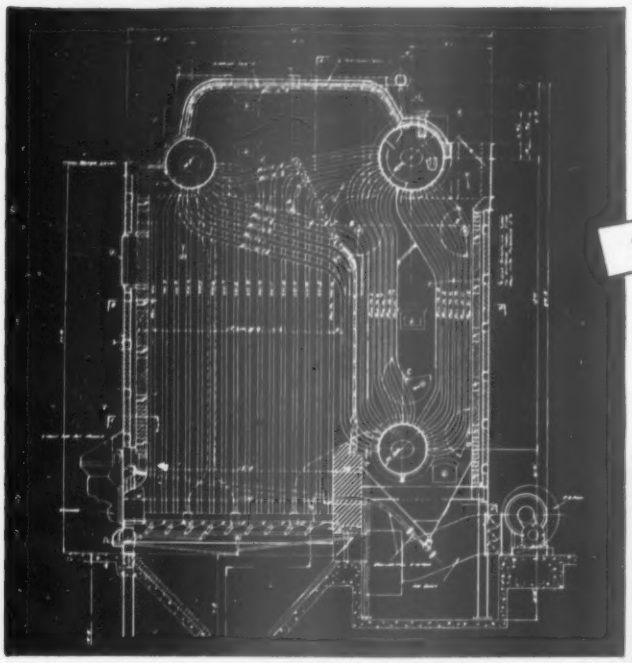
J&L STEEL

JONES & LAUGHLIN STEEL CORPORATION
SUPPLY DIVISION

P·E·S·A

General Offices: TULSA, OKLAHOMA
88 STORES • 19 OFFICES • 9 RESIDENT SALESMEN
EXPORT: 405 Lexington Ave., New York, N. Y., U. S. A

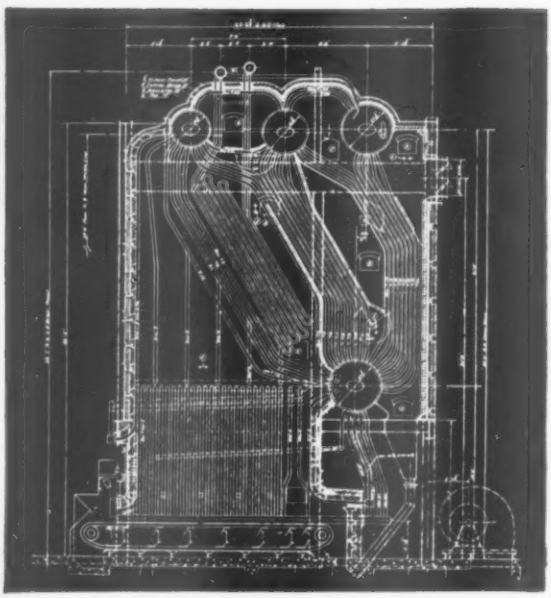
Quick Steaming at all Ratings!



Carry high overloads with high efficiency

SPECIFY Vogt

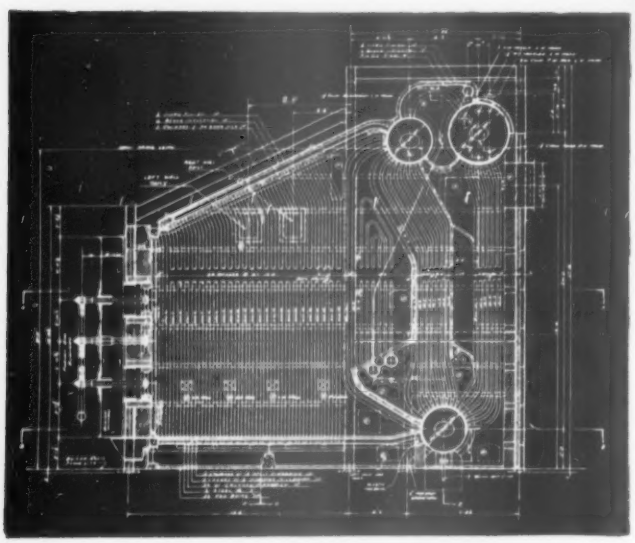
STEAM GENERATING UNITS



CLASS VL Two 27,500 pounds per hour units, installed at Brown-Forman Distillers Corporation, Louisville, Ky. Features large furnace volume in limited space, with high ratio of radiant heating surface.

CLASS LE Mt. Carmel Public Utility, Mt. Carmel, Illinois, is served by this 60,000 pounds per hour unit. Generous steam liberating surfaces and steam space permit wide fluctuations in load.

CLASS VR 70,000 pounds per hour steam generator at Humble Oil and Refining Company, Johnsue, Texas. An efficient, high-duty unit with water cooled furnace, using refinery gas fuel.



Vogt builds a complete line of bent tube steam generators, designed to burn solid, liquid, or gaseous fuels to meet specific operating conditions. Superheaters, air preheaters, economizers, water walls, and soot blowers can be readily incorporated. Bulletins with general information and showing typical installations are available upon request.

HENRY VOGT MACHINE CO.

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BRANCH OFFICES:
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LANE WELLS "Koneshot" process insures maximum penetration with

DU PONT JET PERFORATORS

The Lane-Wells organization (Los Angeles), operating seventy-one domestic branches, and subsidiaries in Canada and Venezuela, is the oldest specializing in oil-well perforation.

Well aware of the importance of deep penetration, Lane-Wells offers customers "plus-value" shaped charge perforating with Du Pont Jet Perforators. They recognize that deeper penetration into the producing formation promotes greater productivity and can mean the difference between a paying well and a dry hole.

Every perforating job presents obstacles. Casing may be eccentric within the well bore. A caving formation in the producing zone may result in cement sheaths of doubtful thickness. Drilling mud filtrate may have permeated the formation and blocked the producing zone.

Surest way to overcome obstacles of this kind is to use perforating tools that give maximum penetration. That is why Lane-Wells recommends and uses Du Pont Jet Perforators.

Laboratory tests, periodically repeated, have assured Lane-Wells engineers that Du Pont Jet Perforators consistently give greater penetration—through one, two, or even three strings of casing—and at temperatures up to 350°F.

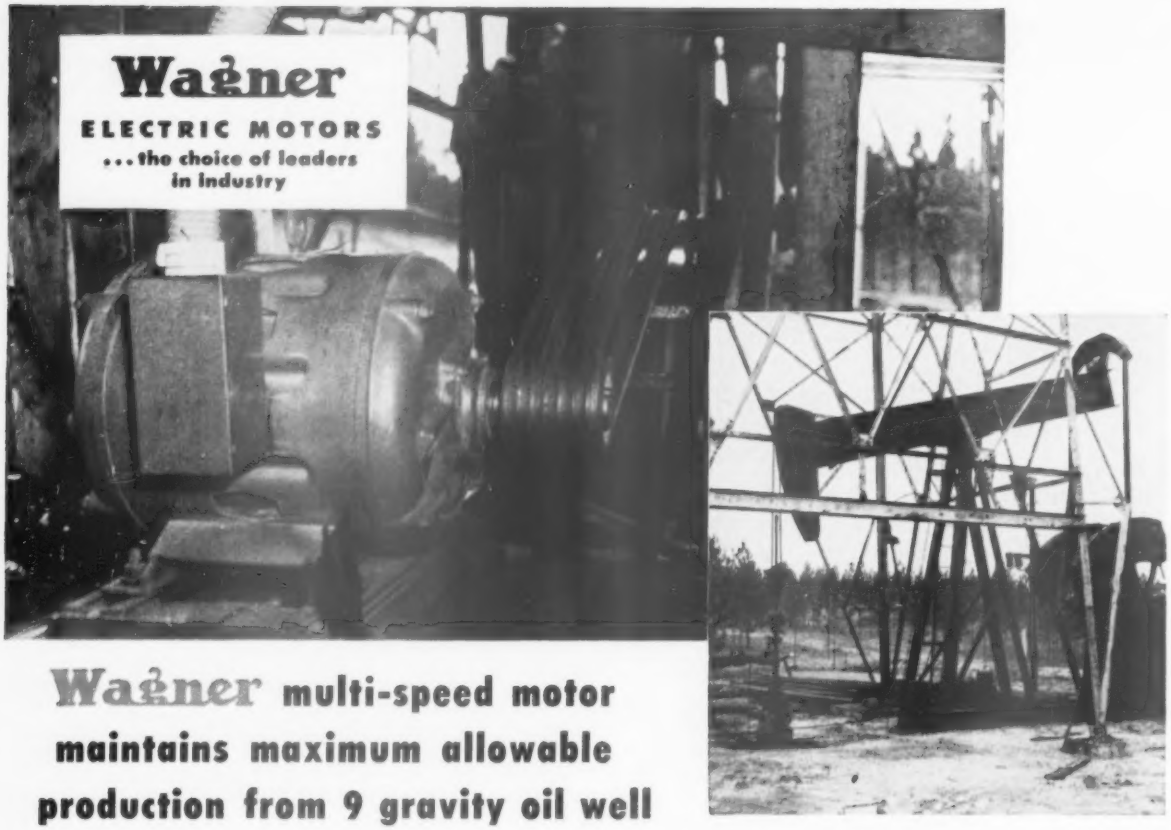
When you're next in the market for perforating service . . . you can be sure you'll get maximum penetration by specifying that Du Pont Jet Perforators be used on the job. And you'll be saving money in the long run. Ask the Du Pont representative in your area for complete information or write: E. I. du Pont de Nemours & Co. (Inc.), Explosives Dept., Wilmington 98, Delaware.

DU PONT EXPLOSIVES

Blasting Supplies and Accessories

DU PONT

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*



Wagner multi-speed motor maintains maximum allowable production from 9 gravity oil well

Obtaining allowable production of 232 barrels a day from this 7,200 foot oil well at Ovett, Mississippi, presents a real problem. The viscosity of the raw production is so great that warmed oil must be circulated in the near surface depths of the well to even enable it to flow. A butane engine on the rig was able to pump only 100 barrels a day.

Then a Wagner four speed motor was installed on the rig. The motor starts pumping at 575 rpm. As the crude oil warms and becomes more pumpable the speed of the motor is increased to 870 and then to 1160 rpm. Allowable production can normally be reached by pumping at the third speed, but if it should fall behind, the fourth speed (1750 rpm) is available to bring production up to the maximum.

Wagner Multi-speed Motors are furnished with any type of housing—open drip-proof, totally-enclosed, explosion-proof, splash-proof, etc., and with various electrical characteristics such as normal torque, high torque, etc.

The loading pump on this installation, not shown, is driven by a 20 hp Wagner splash-proof motor.

For your requirements, there is a Wagner Motor to fit every need—a complete line for all current specifications, with a wide variety of enclosure types and mountings. Bulletin MU-137 gives full information. Do you have a copy?

Your nearby Wagner engineer will be glad to help you select the *right* motors for your next application. Call the nearest of our 32 branch offices, or write us.

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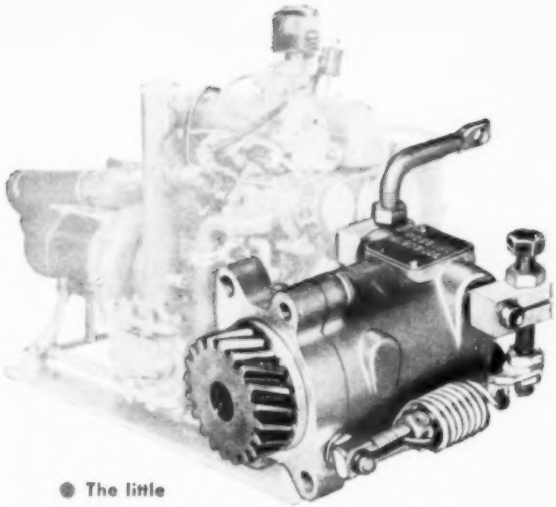
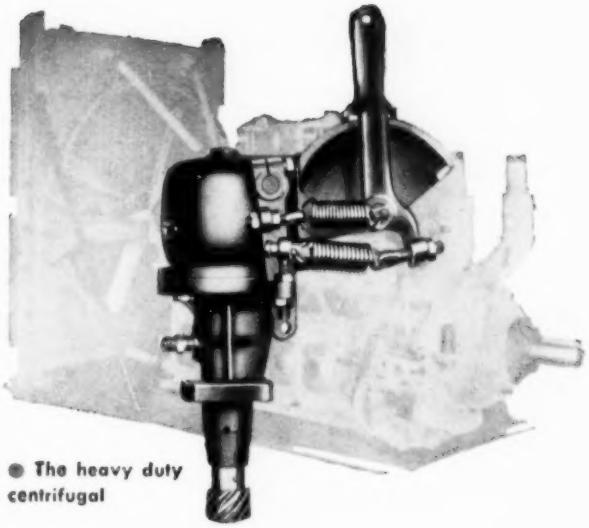
AUTOMOTIVE BRAKE SYSTEMS — AIR AND HYDRAULIC

BRANCHES IN 32 PRINCIPAL CITIES

M53-20



● The little 1400 series

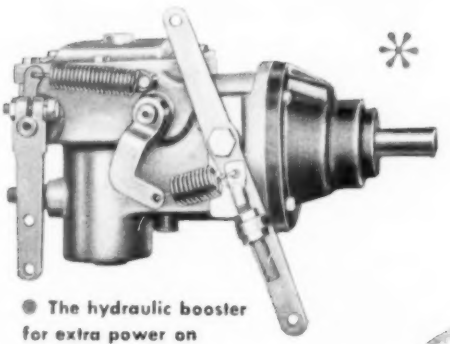


● The heavy duty centrifugal

PIERCE GOVERNORS

preferred for gas (LPG), gasoline and diesel industrial engines... big, medium and small

● The standard long range 900 series



● The hydraulic booster for extra power on racks and valves

Pierce centrifugal governors are your most economical and efficient control mechanisms for industrial engines . . . from small generator sets to monster power units . . . gas (LPG), gasoline or diesel. For engines requiring extra power to position fuel rack or valve, the Pierce centrifugal with hydraulic booster * (for original equipment only) is ideal! Service is locally available . . . your nearby Pierce Service Station is equipped for all types of Pierce Governors.

Specify PIERCE Centrifugal governor on your engines . . . for economical, thoroughly dependable control in industrial applications.

PIERCE — THE MARK OF QUALITY

THE PIERCE GOVERNOR CO., INC.
1620 OHIO AVENUE, ANDERSON, INDIANA
"World's Most Experienced Governor Manufacturer"

Save the beans - throw away the holes

● Illustrated — Unibolt Flow Manifold for single wing tree, consisting of Unibolt Tee, Wing Valve, and Positive Choke Body.

LOW COST

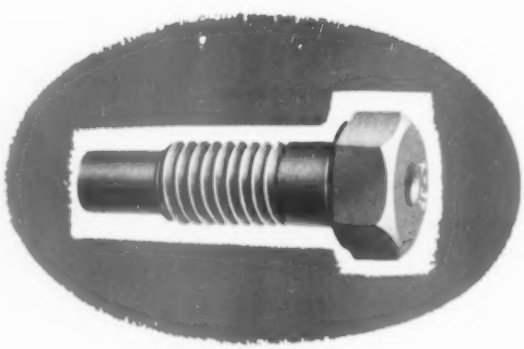
UNIBOLT

X-BEAN INSERTS MAKE POSITIVE CHOKES AS GOOD AS NEW

You don't have to change beans. Change inserts. You accomplish the same results but for a fraction of the cost. Unibolt Master Beans, for Unibolt Choke Bodies and Unibolt Cage Nipples, are drilled to receive a small replaceable insert. So, when the insert wears out just replace it . . . save the bean.

These little inserts are available in **42 "X" sizes under 14/64ths.** That means that they are drilled in increments of 5% and 10% of well flow rather than in increments of 1/64th inch. Consequently, the flow of fluid or gas can be positively controlled with a degree of accuracy never before attained. If, for example, a well produces 10 bbls. through a 1/64-inch choke, to increase the choke to the next largest fractionally drilled size, 2/64-inch, would increase the production to approximately 40 bbls. On the other hand, a well that produces 10 bbls. through a size X-35 UNIBOLT X-Bean would produce only 10½ bbls. through the next largest size X-Bean, X-35.5; 11 bbls. through an X-36, and so on.

This accurate control of production is a safeguard against the harmful effect of periodically pulling a well too hard in order to make its allowable.



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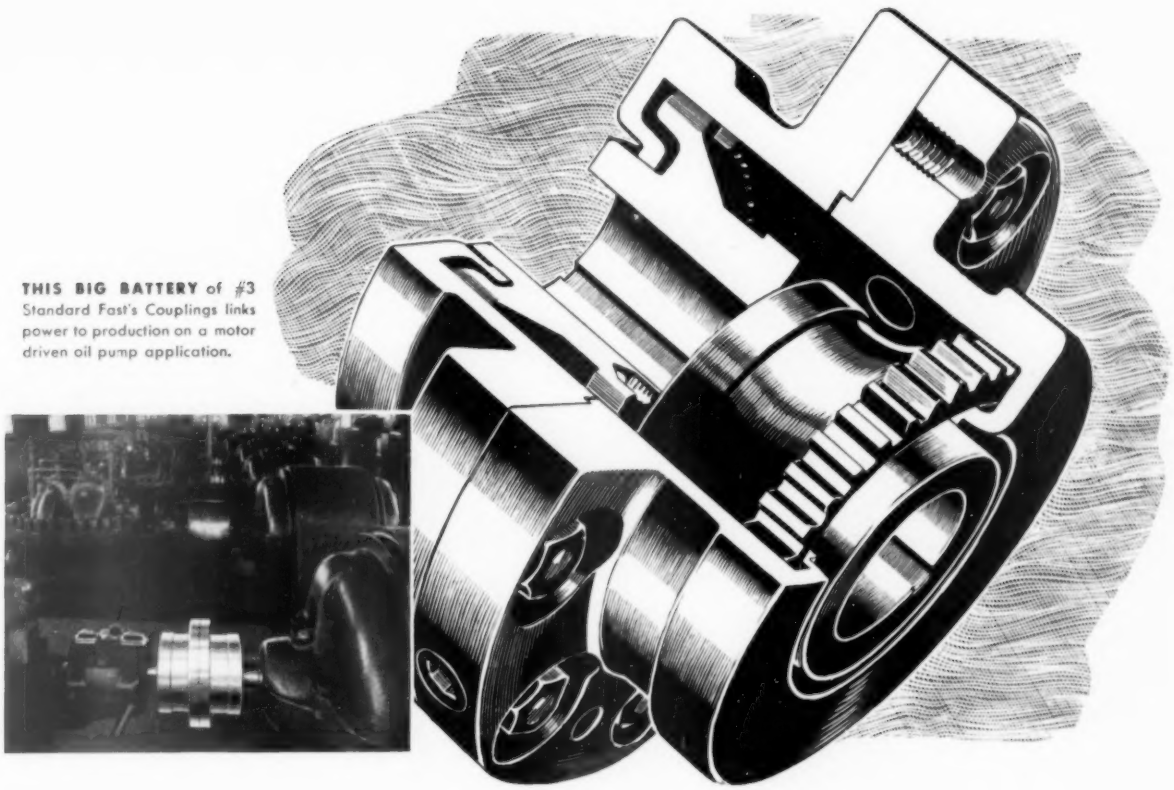

THIS BIG BATTERY of #3 Standard Fast's Couplings links power to production on a motor driven oil pump application.

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FAST'S Couplings are FIRST!

When you specify Fast's Couplings, you get the benefit of Koppers *free engineering service* . . . your assurance of the right coupling for any job and the right solutions to tough coupling problems.

FOR EXAMPLE: "Get the drawings and send them down to Koppers" is the standard answer in one plant whenever a tough coupling application arises!

FOR EXAMPLE: After studying a list of spares for stand-by units made up by one customer, a Koppers sales engineer eliminated duplications . . . resulting in a smaller order for him but a *much smaller inventory* for the customer!

Add the *rugged construction* of Fast's Couplings . . . with their original design maintained without basic change or sacrifice in size or materials. Add their lowest cost per year . . . their life expectancy guarantee. *Fast's usually outlast the equipment they connect.* Result: it will pay you to write today for full details on how Fast's Couplings and Koppers Engineering Service can help you get uninterrupted power transmission! Send for free catalog to: KOPPERS COMPANY, INC., *Fast's Coupling Dept.*, 289 Scott Street, Baltimore 3, Md.

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HALLIBURTON'S *NEW* HYDRO-SPRING TESTER

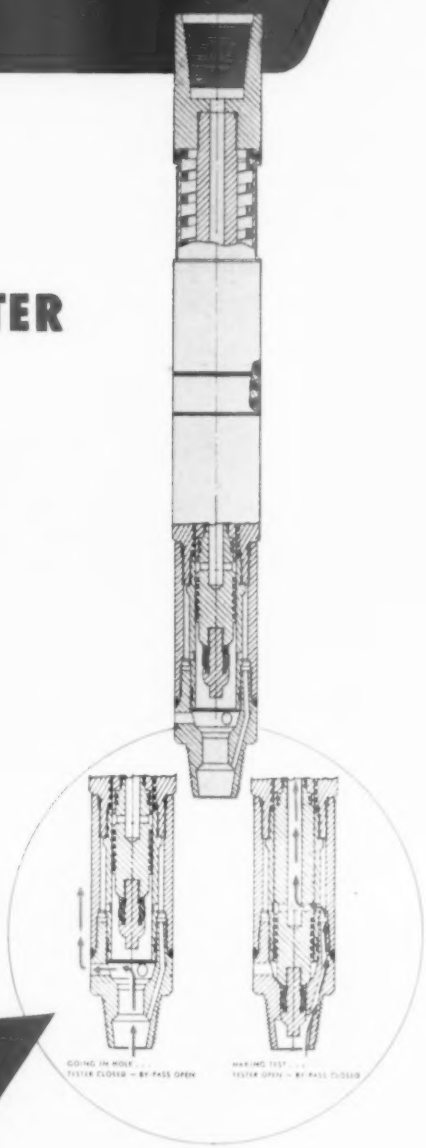
Tight holes present no problem to Hydro-Spring. Its locked-open By Pass takes the packer through filter-caked sections smoothly, easily, and fast.

This Halliburton feature serves to eliminate undue spudding, drill pipe manipulation, and surging pressures on the recording chart. By Pass also helps prevent pressure buildup below the packer and possible breakdown of formations, loss of circulation, forcing of mud into test formation.

New Hydro-Spring offers many other advantages: It opens easily by weight of drill pipe with positive indication at surface, it permits reversing off bottom while taking closed-in pressure, it can be rotated while coming out of hole.

Along with this new testing tool you get Halliburton's Bourdon Tube – the most precise pressure recording device – Halliburton's million-job experience, minutes away service, lots of things that make Halliburton best for your drill stem test.

The success of exploration or development drilling is often determined by formation testing. Make sure you get the most modern test, the most accurate and complete data available – phone your nearby Halliburton Testing Operator or contact Halliburton Oil Well Cementing Company, Duncan, Oklahoma.



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Hydro-Spring Tester—Patent Applied For

YEARS AHEAD IN DRILL STEM TESTING!

You can measure the Quality of

PITT CHEM Modified Enamel

by *Written Specifications*

CHECK the specification sheets of Pitt Chem Modified Enamel and you'll see *why* this tough, durable pipeline coating performs better on application and lasts longer in service. For we've set up rigid written standards on softening point, ash, penetration, etc., and every drum of Pitt Chem Modified Enamel must measure up before shipment.

This quality-controlled enamel will heat up faster, flow better from kettle to pipe and coat more pipe per ton over a wide temperature range. And remember this: *Pitt Chem's uniform top quality means better, longer-lasting protection underground.* ● Write today for more product data, technical information or on-the-spot application assistance.

W&D 4536

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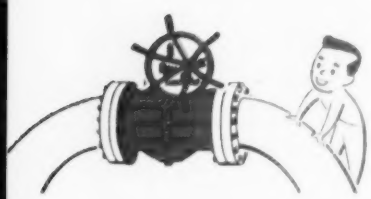
Let's Face the Facts . . .

DOES VALVE LUBRICATION

Now and then someone revives an old argument—"it costs too much to maintain lubricated valves."

On the surface, that sounds logical. But if that really was a fact, millions of Nordstrom lubricated valves in service today could never have been sold.*

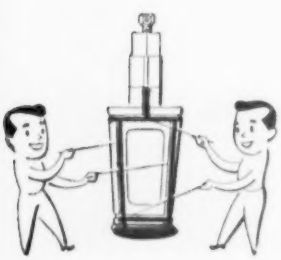
WHAT IS THE ADVANTAGE OF A LUBRICATED VALVE?



The most important function of lubricant in a Nordstrom valve is to give a tighter seal than can be accomplished through any other method yet developed. The thin film of plastic lubricant that is forced around the ports of the plug is a pressure seal in itself.

Of course, the lubricant has other obvious advantages—the same advantages it has in your automobile, or in any other mechanical equipment where metal rubs metal. The lubricant all but eliminates the possibility of galling or seizing, and consequently keeps the valve ready to operate in a hurry. A lubricated Nordstrom valve operates easily even against high line pressures, because the plug turns *within* the line, rather than being forced or wedged *against* it. Since it takes only a quarter turn of the plug to open or close the valve, it operates in seconds instead of minutes.

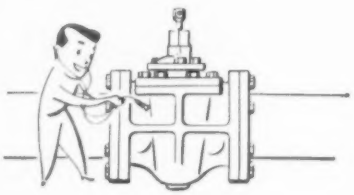
WHAT DOES THE LUBRICANT DO?



In a Nordstrom valve, lubricant is forced through a series of grooves surrounding the plug ports. There it acts as an extra seal against the little leaks that become big problems. It is also forced into a lubricant chamber at the small end of the plug where it serves as a hydraulic jack to keep the plug easy to turn.

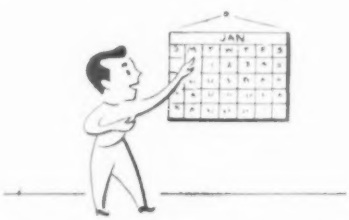
Finally, it *lubricates* . . that is, it prevents grinding wear, fills tiny imperfections that may develop, and it lets the plug slide without grating.

WILL A NORDSTROM VALVE WORK WITHOUT LUBRICANT?



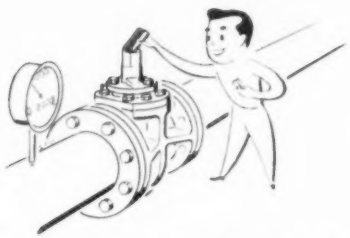
Yes, but then the whole advantage of a lubricated valve is lost. Your car will also operate without lubricant, but with proper lubricant, it is far more efficient, lasts many, many times longer, needs much less maintenance, and is safer. So is a valve. Nordstrom is fundamentally a valve—a plug valve made to exceptional standards of tolerance and quality—but it is the internal Nordstrom lubrication system which raises its performance standards above ordinary valves.

HOW OFTEN SHOULD NORDSTROM VALVES BE LUBRICATED?



Like your car, that depends upon the service—the temperature, process, frequency of operation, etc. It's hard to generalize, but your Nordstrom sales engineer can advise you. Using Rockwell lubricants, made especially for Nordstrom valves, is one way to reduce frequency of lubrication in many cases. Also, Rockwell markets mechanical lubrication equipment to make scheduled lubrication easy. Nordstrom Hypreseal valves are now built with an external fitting so that it is unnecessary to remove any parts from the valve before lubrication.

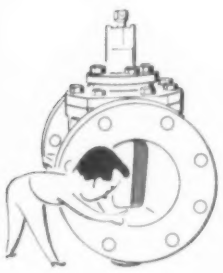
COST MONEY OR SAVE MONEY?



WHAT LUBRICANTS SHOULD BE USED?

Part of the effect of lubricating your car is lost if you use improper lubricants. That is also true of lubricated valves. Genuine Rockwell lubricants will save you money—they are the result of the longest and most extensive research into valve lubricants by any company. They are the result of years of field experience with nearly every process condition. For many services there are variations of Rockwell lubricants compounded to offset specific line conditions. Also, for many services Rockwell Hypermatic lubricant may be recommended. This lubricant, which is compressible and energizable, regenerates itself in the lubrication system, greatly reducing lubrication frequency. In any case, consult your Nordstrom sales engineer.

HOW LONG WILL PROPERLY LUBRICATED NORDSTROM VALVES LAST?



That's impossible to answer, since many of the first Nordstrom valves put into regular service are still going strong. The service has a lot to do with it, naturally. In gas service, there are many valves with more than 30 years service. In the valve-killing application of drilling rig mudlines, Nordstrom valves have been disassembled for inspection after more than 150,000 feet of hole on many occasions, found to be without wear, and returned for more service—often four times the life of ordinary valves. In a two-year paint plant test, Nordstrom valves were the only ones that did not need to be replaced because of leakage. Nordstrom files are full of such authentic field case histories—ask your Nordstrom sales engineer.

WHAT ABOUT MAINTENANCE COSTS FOR NON-LUBRICATED VALVES?

In any but the most simple services, any kind of valves need *some* maintenance. But in the case of Nordstrom valves, maintenance is generally confined to adding lubricant at intervals. Over a 20-year period, Nordstrom sales of repair parts have been less than half of one per cent of sales. In several plants in which records were kept and where Nordstrom and other valves were used, repair parts for Nordstrom valves ran about one-tenth of other makes.

The analogy to your car carries over here—if you don't lubricate it, you save on lubricant, but pay the far, far higher costs of part replacement. And more particularly, you'll need a new car much more often.

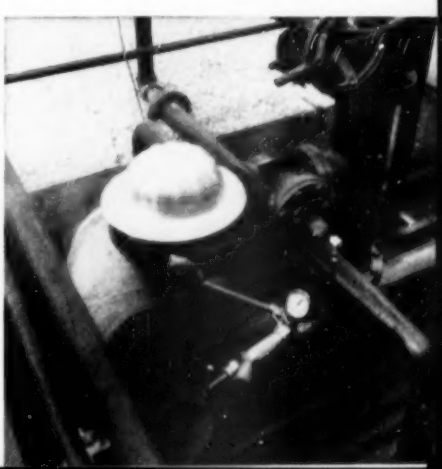
When you consider valve maintenance, be sure to count *all* the costs—not just simple service, but major repairs and complete replacement costs, shutdowns, extra labor to operate, and *all* factors.

If you do, if yours is a typical application, you'll find that year-in and year-out, the most economical valves you can use are Nordstroms.

If you'd like to discuss the suitability of Nordstrom valves for any service, let us know. Rockwell Manufacturing Company, Pittsburgh 8, Pa.

ROCKWELL Built
Nordstrom Valves
Lubricant-Sealed for Positive Shut-Off

* Nordstrom invented lubricated valves more than 30 years ago. Since that time, several million have been installed in hundreds of widely varied petroleum, gas, chemical and other process services. With by far the most complete range of sizes and pressures, and many patents on construction details, Nordstrom is the leader in lubricated valves.



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run a TUBOSCOPE corrosion caliper survey now

MEASURES EROSION
MEASURES CORROSION
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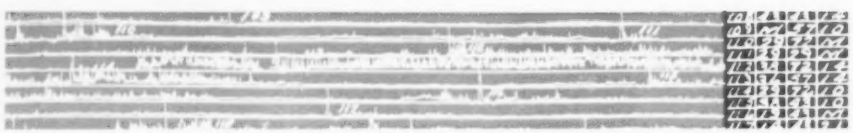
IN A SINGLE RUN



Now, after a winter of hard pulling, make certain that your wells will be ready for next winter. The risk of expensive fishing jobs and shut down time can be eliminated by periodic tubing caliper surveys. All Tuboscope caliper surveys feature the exclusive base line and give complete information on the internal condition of your tubing. Corrosion, erosion, rod wear, or a combination of these factors, can be determined in a single run by a Tuboscope Caliper Survey. You can be certain of the condition of your tubing after a Tuboscope tubing caliper survey without pulling good strings of tubing. Call Tuboscope now to survey your producing wells.

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power

for reaching new reservoirs of power

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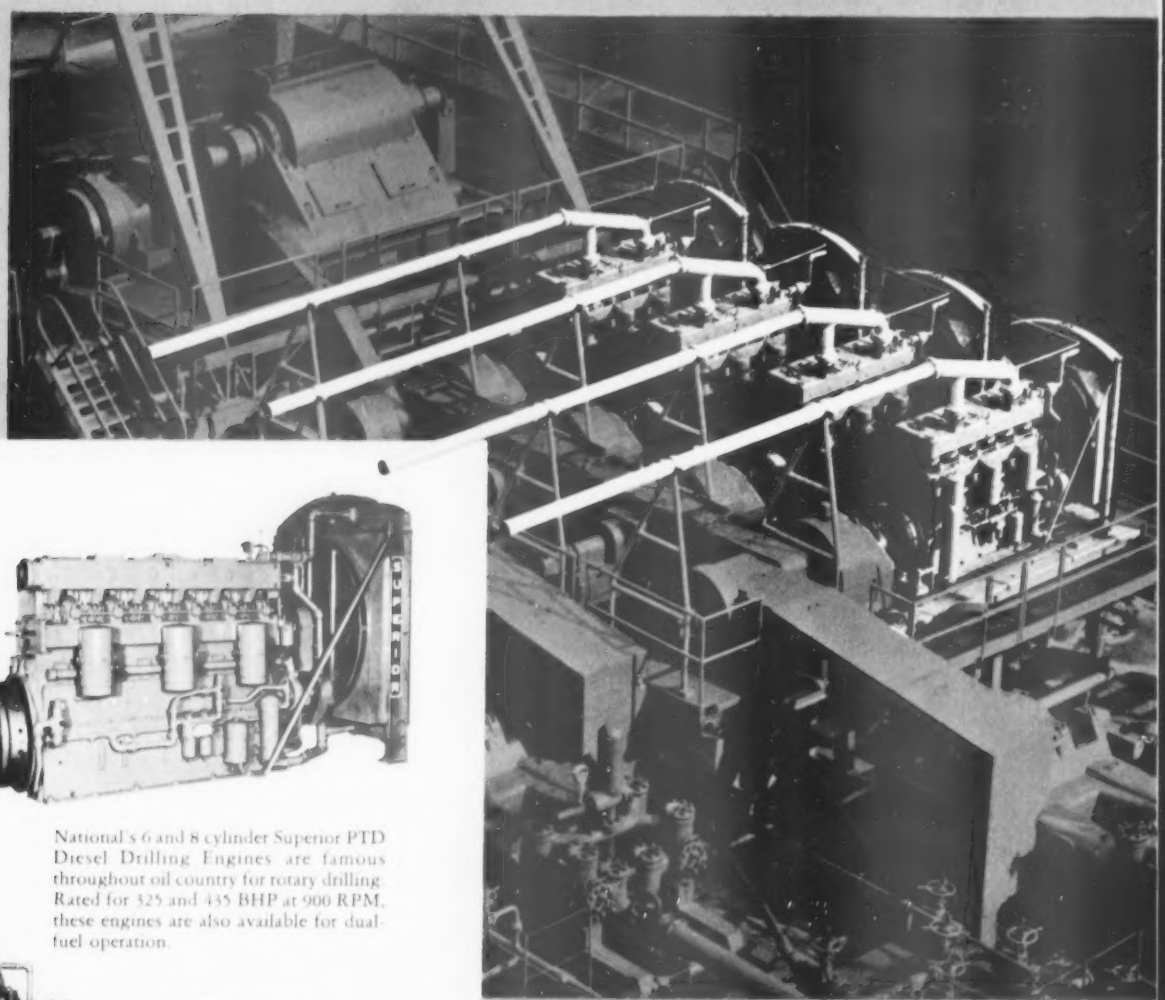
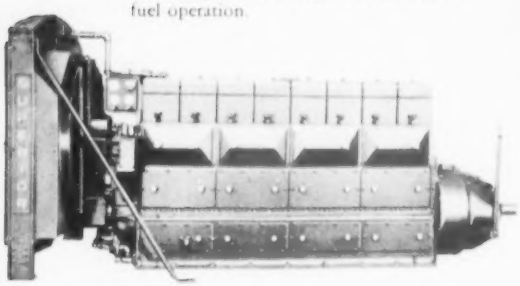
This exclusive oil country association and "know-how" stands behind every Superior engine you put into service — to give you peak performance, exceptionally long life under load, and low operating costs. Like the complete family of National's "Ideal" drilling equipment, "National" production equipment and "Spang" tubular products — National's "Superior" engines are designed and built to work as efficient power plants in the complete integrated system of machinery needed for maximum economy in oil recovery.

THE NATIONAL SUPPLY COMPANY
PITTSBURGH 30, PENNSYLVANIA

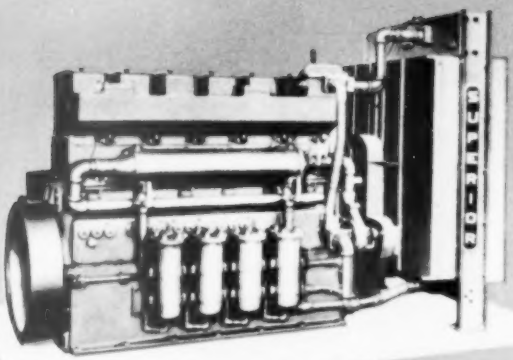
SUPERIOR *Gas and Diesel* ENGINES



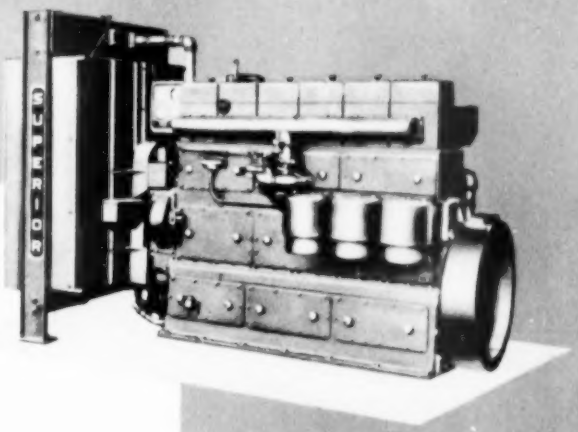
National's 6 and 8 cylinder Superior PTD Diesel Drilling Engines are famous throughout oil country for rotary drilling. Rated for 325 and 435 BHP at 900 RPM, these engines are also available for dual-fuel operation.



PROVEN ECONOMY AND PEAK PERFORMANCE FOR DRILLING AT EVERY DEPTH



NEW—National's 6 and 8 Cylinder Superior G-825 Gas Drilling Engines for heavy duty oil field service. Rated respectively at 510 BHP and 675 BHP at 900 RPM. Exhaust and operating sides of 6 cylinder G-825 are shown at left and below.

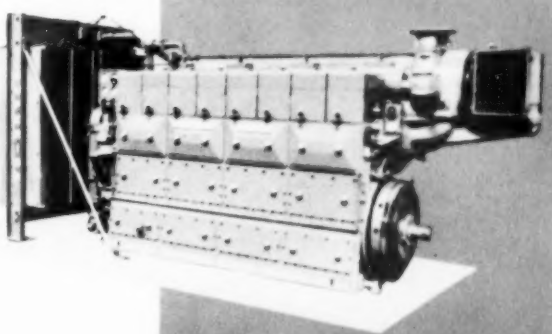


Engineered for maximum simplicity in operation, complete accessibility to parts, and minimum maintenance, Superior Engines provide ample power for operation of rotaries, mud pumps and draw works in today's deepest drilling jobs.

And, to meet the wide variety of power requirements in the field, Superior manufactures an extensive line of Diesel, Dual-Fuel and Gas Engines. Superior's PTD series is built in 6 and 8 cylinder models, naturally aspirated or supercharged, for dual-fuel operation in ratings of 325, 435, 500 and 675 BHP. Superior's Gas Engine models, for natural gas or butane, are available in the 6 cylinder 6G-510 rated at 370 BHP, or in the 6 and 8 cylinder G-825 models rated at 510 and 675 BHP.

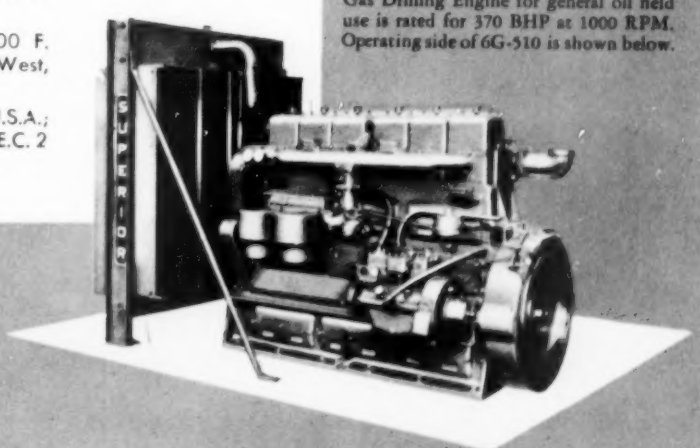
Superior Engines are so designed as to operate singly or in multiple groupings with National "Ideal" Sectional Drive Groups to meet every oil field requirement for power application in drilling.

To be sure you have the latest performance charts on Superior Engines, ask your local National Supply Representative or National Supply Store for the newest Superior Engine Bulletins today.



National's 6 and 8 cylinder Superior *supercharged* PTDS Drilling Engines provide maximum power for deepest drilling. Rated at 500 and 675 BHP at 900 RPM, these Superior Engines are also available for dual-fuel operation. Operating side of 8 cylinder PTDS is shown above.

National's 6 cylinder Superior 6G-510 Gas Drilling Engine for general oil field use is rated for 370 BHP at 1000 RPM. Operating side of 6G-510 is shown below.



NATIONAL BLUE PRODUCTS

THE NATIONAL SUPPLY COMPANY

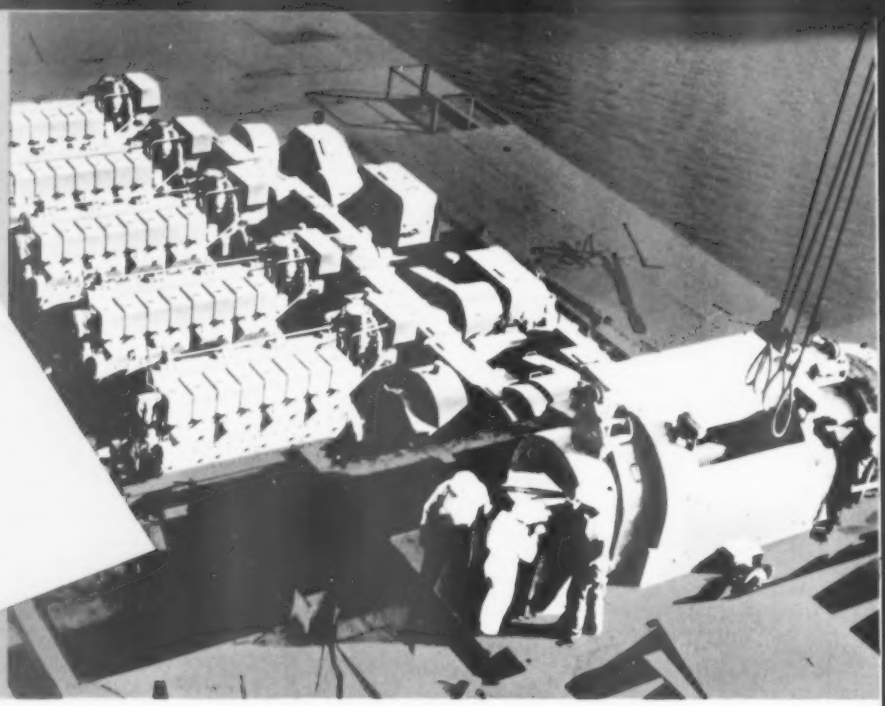
PITTSBURGH 30, PENNSYLVANIA

DIVISION OFFICES: Denver • Ft. Worth • Houston
Pittsburgh • Tulsa • Torrance

CANADA: The National Supply Company, Ltd., 200 F. W. Clark Building, 709 Eighth Avenue, West, Calgary, Alberta

EXPORT: 600 Fifth Avenue, New York 20, N.Y., U.S.A.; River Plate House, 12 South Place, London, E.C. 2

NATIONAL OIL FIELD MACHINERY AND EQUIPMENT •
SPANG STEEL PIPE •
SUPERIOR & ATLAS ENGINES



for shallow wells or deepest drilling operations— integrally designed

IDEAL®

DRIVE GROUPS

Oil field needs in power transmissions, as well as power plants, have also been the subject of a continuing research and development program at National Supply.

As a result of continual close association with oil field drilling practices and problems, Ideal Drive Groups have been engineered to provide exceptional versatility to meet virtually every drilling requirement. For example, Ideal Drive Groups feature—

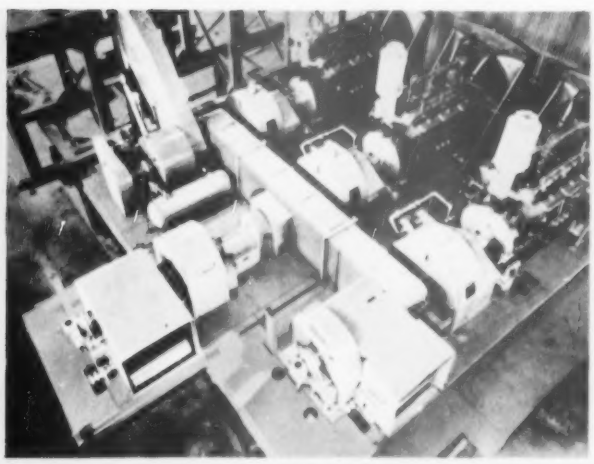
SECTIONALIZED CONSTRUCTION, with each section a completely and accurately aligned portable unit

WIDE POWER RANGE, with engine and drive combinations from 400 to 2000 horsepower

SLUSH PUMP DRIVES, both independent or integral types, for every fluid requirement

THREE TYPES OF TRANSMISSIONS—a choice of mechanical, "Ideal" Gyro, or "Ideal" Torque Converter.

There are new product bulletins covering complete details on Ideal Drive Groups, Ideal Independent Pump Drives and Superior Gas and Diesel Drilling Engines— ask for your copies at the nearby National Supply Store.



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NATIONAL OIL FIELD MACHINERY AND EQUIPMENT • SPANG STEEL PIPE • SUPERIOR & ATLAS ENGINES

THE NEW Fluor Heavy-Duty Industrial Muffler for 2 and 4-cycle engines incorporates in a single unit highly efficient acoustic elements for silencing engine and compressor exhaust and intake noise. The Series "C" Muffler is compact, rugged, easily installed, competitively priced, and is recognized for these three important design features:

high sound attenuation

Utilizing acoustical filter principles, Fluor mufflers efficiently attenuate both low and high-frequency sounds with minimum resistance to gas flow. By suppressing pipe resonance, the unique, deresonating "fishmouth" entrance allows complete freedom in muffler placement without sacrifice of performance.

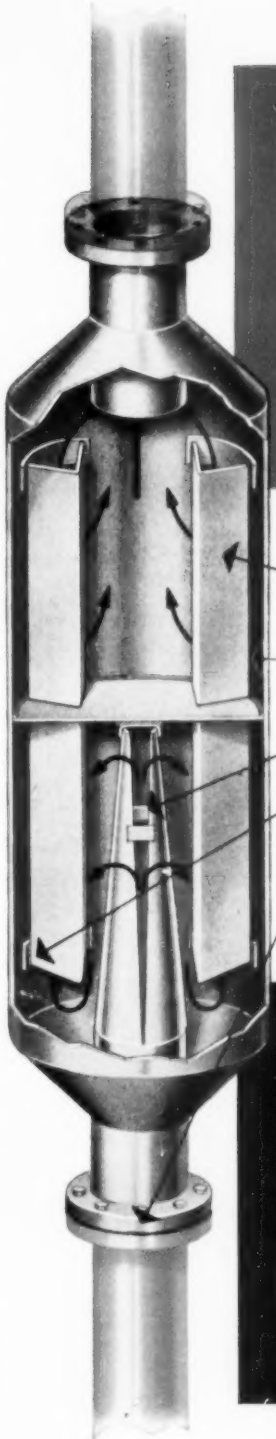
low back pressure

The Fluor-engineered, angle-shaped gas passages in the muffler afford significantly lower resistance to gas flow, for a given acoustic effect, than do mufflers having interchamber tubes of conventional design. Better fuel economy, lower exhaust temperatures with consequent improvements in engine longevity, are dividends yielded by low back-pressure Fluor mufflers.

engineered construction

Long experience in pressure vessel design and construction is reflected in Fluor mufflers. High safety factors, high strength-to-weight ratio, and superior fabrication, provide a long trouble-free operational life. Freely-venting internal structure eliminates explosive gas pockets and susceptibility to explosions.

For other Fluor Acoustic Products—Ventilating Mufflers utilizing "free" kinetic energy of exhaust gases, mufflers for special applications, pulsation dampeners—consult your nearest Fluor office.



BIGGEST BUY in mufflers today!

Angle-shaped gas transfer passages with large cross-sectional areas.

Continuous bleeder slots along edges of angles.

Deresonating "fishmouth" entrance Tube.

Heavy gauge welded construction

Gas Inlet.

FLUOR heavy-duty Series "C" MUFFLERS

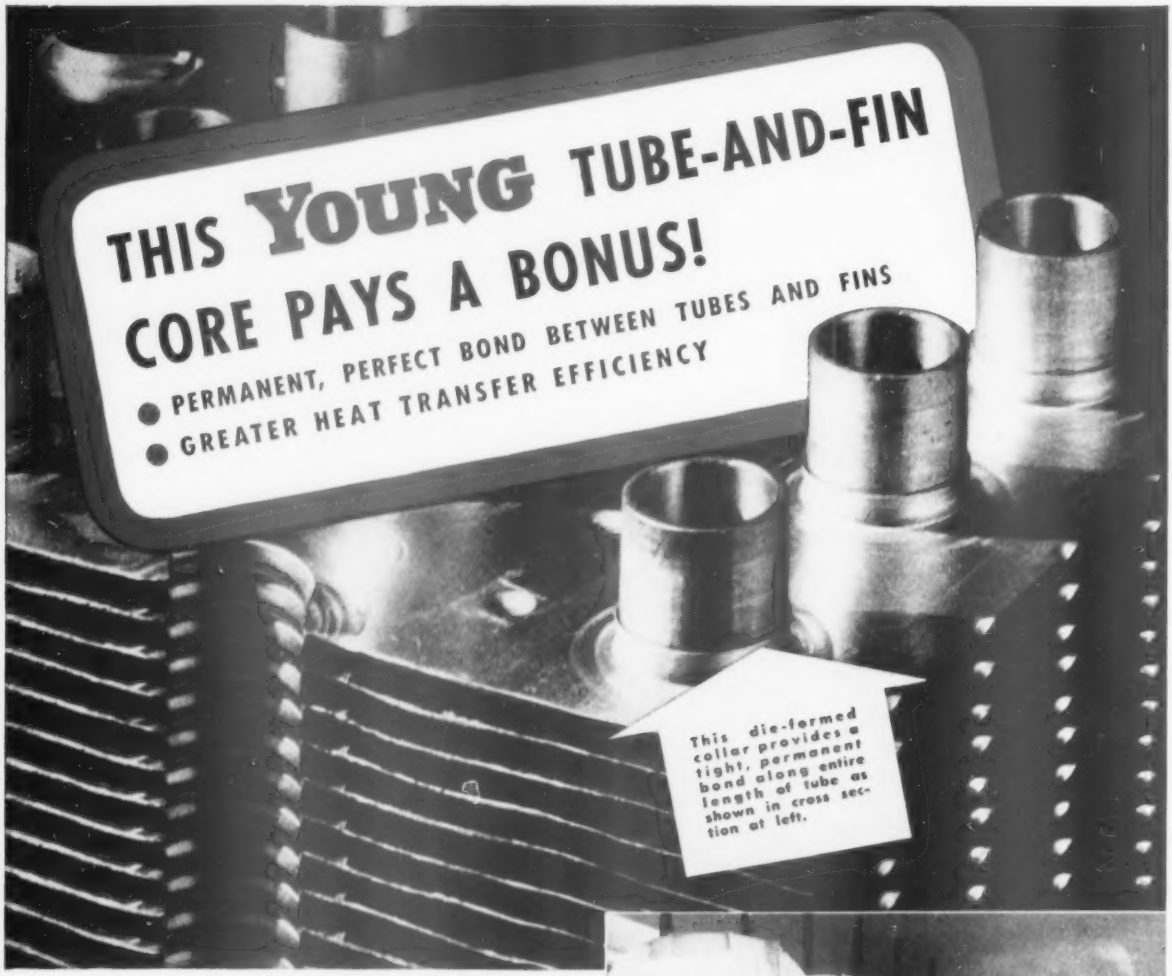
BE SURE WITH **FLUOR**

THE FLUOR CORPORATION, LTD.
LOS ANGELES 22, CALIFORNIA

FOREIGN FACTS—FLUOR, PARIS
FLUOR OF CANADA—TORONTO
FLUOR INTERNATIONAL—REFINT
HEAD WRIGHTSON—LONDON

ENGINEERS
CONSTRUCTORS
MANUFACTURERS

NEW YORK
CHICAGO
PHILADELPHIA
BOSTON
PITTSBURGH
SAN FRANCISCO
HOUSTON
BIRMINGHAM
TULSA


THIS YOUNG TUBE-AND-FIN CORE PAYS A BONUS!
● PERMANENT, PERFECT BOND BETWEEN TUBES AND FINS
● GREATER HEAT TRANSFER EFFICIENCY
This die-formed collar provides a tight, permanent bond along entire length of tube as shown in cross section at left.

Here's why Young-designed and built tube and plate fin cores give greater heat transfer efficiency . . . stand up better under peak capacity operation . . . pay bigger dividends in longer trouble-free service. The outstanding design and construction of the Young plate type fin core, shown above, features specially die-formed reinforced collars which make a continuous, *permanent* bond between fins and tubes . . . providing maximum heat transfer and greatly stronger, longer-lasting cores.

This mechanical structure of greater strength which permits the use of the most desirable metals chosen for the job — copper, aluminum or other alloys — is attributable to Young's precision-manufactured, high-quality cores.

Whatever your need, consult your nearest Young Sales Representative to help you select correct cores — types and sizes — and discuss any phase of your heat transfer problems.

OIL FIELD REPRESENTATIVES:
J. R. MEEK COMPANY, 1141 S. Boston St., Rm. 109, Tulsa.
FLOURNOY & EVERETT, INC., 5043 Santa Fe Ave., Los Angeles.
HAROLD J. YOUNG, 206 Montgomery Bldg., Muskegon.
JONES & LAUGHLIN STEEL CORP., Supply Div., 106 Main St., Bradford, Penn.; Union Commerce Bldg., Cleveland; 401 Liberty St., Gateway Center, Pittsburgh; Clarksburg, West Virginia.
Other Representatives In Principal Cities

One of our many important installations is the Reynolds Metals Company's new San Patricio, Texas plant which uses more than 80 Young units featuring the new "bonus" core for cooling engine jacket water and lube oil, and 91 additional units of Young variated, specially designed construction.

YOUNG RADIATOR COMPANY
Dept. 204-J, Racine, Wisconsin
Plants at Racine, Wisconsin and Mattoon, Illinois

YOUNG

Heat Transfer Products for Automotive, Agricultural, Industrial, Gas and Diesel Engine Applications

Heating, Cooling, Air Conditioning Products for Home and Industry

Leaders in Heat Transfer Engineering for more than 25 years

fabulous

the fabulous

Oil reserves in Arabia, Iran, Iraq and Kuwait are fabulous indeed. They are headlines today and have great international significance.

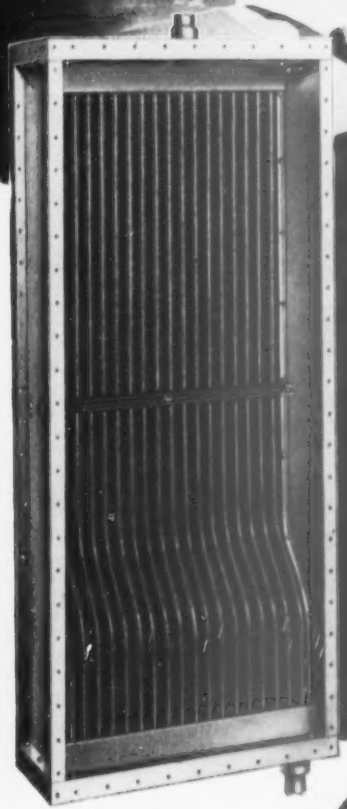
However, manufacturers of petroleum equipment must never lose sight of the fact that Latin American countries to the south of us are considerably more important today as purchasers of production and refinery equipment because the Latin American countries produce substantially more oil and refine a great deal more oil than countries of the Middle East.

Politically, economically, traditionally and technically, the Latin American petroleum equipment market is more favorable for American manufacturers.

Ask any Petroleo Interamericano representative to tell you of our service designed to assist those who wish to advertise to this important export market. These services include translating service, direct mail service, catalog printing and distribution, market facts and advertising copy aids.

Latin America's total daily production during 1952 was 2,314,300 barrels daily, compared with 2,095,000 barrels daily in countries of the Middle East.

Latin America's refining capacity in 1952 aggregated 2,180,200 barrels daily, compared with the total refinery capacity of the Middle East countries of 1,112,000 barrels.



ASK THE AEROFIN MAN

About Practical Heat Exchange

There is a competent Aerofin heat-transfer engineer near you—qualified by intensive training and long experience to find the *right* answer to your own particular heat-exchange problem—and backed by the research and production facilities of the pioneers in light-weight extended surface.

Ask the Aerofin Man.

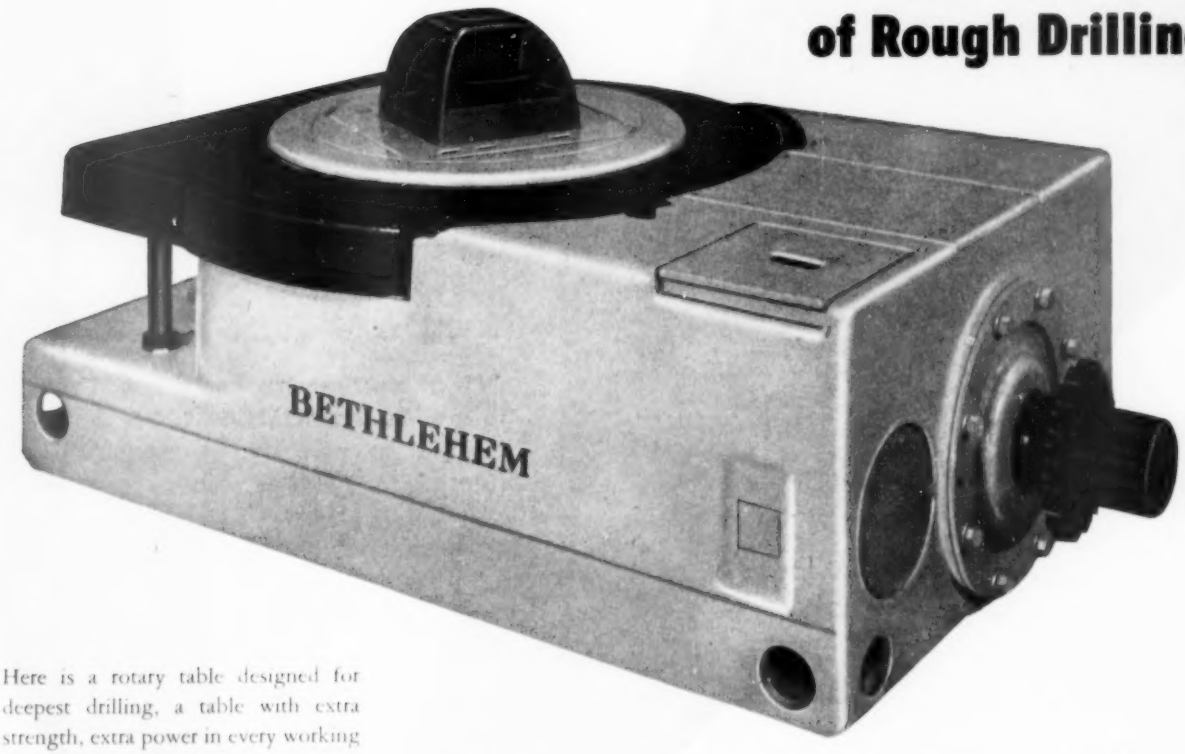
Aerofin is sold only by manufacturers of nationally advertised fan system apparatus. List on request.

AEROFIN CORPORATION

410 South Geddes St., Syracuse 1, N. Y.

BETHLEHEM'S B-21-TA

The Rotary that can take the Shocks and Jolts of Rough Drilling



Here is a rotary table designed for deepest drilling, a table with extra strength, extra power in every working part. But strength isn't the whole story. The B-21-TA has something more. It is built to absorb the effects of shocks and vibration; built to iron out the jolts that sometimes occur during sudden take-up of load, changes of driving speed, etc.

What mechanical features account for this smoothness? How do they function as the table operates?

First, the wide-spaced, large-diameter pinion-shaft bearings provide rigidity of the shaft and maintain accurate alignment of pinion with table gear. Second, the self-aligning spherical roller bearing next to the sprocket absorbs thrust from the pinion and positions the shaft. Third, this large bearing easily handles any load that it is ever called upon to carry.

The table revolves on quiet ball bearings; which are oil-bath-lubricated from a central reservoir. Pinion and ring gear also receive a flood of oil from this reservoir. Pinion shaft bearings, on the other hand, are reached by a pressure-grease system. Efficient oil seals completely exclude mud from the bearings.

There are other features you'll like, too—for instance, the positive table lock, accessible even when the top of the rotary is flush with the floor. Why not let us go over all details with you? Say the word and a Bethlehem man will gladly supply full information.

BETHLEHEM STEEL

BETHLEHEM SUPPLY COMPANY

General Offices: 21 E. Second St., Tulsa, Okla.
West Coast Headquarters: Los Angeles, Calif.

Export Distributor: Bethlehem Steel Export Corporation
25 Broadway, New York, N. Y.

MECHANICALLY
CONTROLLED
ARC WELDING
ONE of many controlled steps
to qualify in AMERICAN IRON
AMWELD
TRADE MARK REG.
(counterbore weld)
TOOL JOINTS
As shown above, AMWELD Tool Joints are welded to drill pipe by a submerged arc — the finest mechanically controlled arc welding process known. The mechanically fed rod, plus the continuous flowing flux covering all flash, assures smooth, even welds free from foreign elements. The drill pipe, with tool joint bucked on, is held at an 80° angle and mechanically rotated during the welding process.
AMWELD Tool Joints are for operators who prefer regular A.P.I. Joints welded on their drill pipe (and welded on to hold)! AMWELD is the registered trade name for American Iron's superior design and method used in welding these widely used tool joints.
District Office — Houston, Texas
AMERICAN IRON & MACHINE WORKS CO.
MANUFACTURERS OF
OIL FIELD EQUIPMENT
A
REG. U.S. PAT. OFF.
OKLAHOMA CITY U.S.A.

They Say—

How to Build Strong Industry

"The United States needs to be strong in the world today, and that requires healthy industry, and most particularly, a strong oil industry. We cannot have a strong oil industry unless we have a healthy, vital retail segment.

"We should remember that the supplier and his dealer have a common objective — greater profit. Because of this common objective, business performance suggestions made by suppliers are at least well-intentioned. Suppliers' suggestions have their roots in actual dealer experience. They aren't just dreamed up out of space."

Dwight T. Colley, vice president and general manager of marketing of the Atlantic Refining Co., addressing the National Congress of Petroleum Retailers, Pittsburgh

War Not a Blessing to Business

"War is a calamity to business as it is to the nation generally. To look only at the financial side, war is terrifyingly expensive and the share of its cost borne by business is very substantial.

"The future is mortaged. Research and development are delayed and interrupted; personnel is diverted from creative pursuits to the taut necessities of the moment. Clearly, those who see war as a business blessing have no talent for simple arithmetic.

"There is, in my opinion, no more reason to credit current pessimism than there was to take to the woods in 1945. Any assumption that business is unequal to the tasks of peace does a disservice equal to a charge that it is unequal to the task of war. The record would indicate, I submit, that it is fully equal to both."

A statement released by Crawford H. Greenewalt, president of E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

Imports Needed to Supplement Reserves

"The question of imports of oil is admittedly a controversal one within the United States oil industry. The oil producers who operate purely within the country have a somewhat different point of view from that which I and others in the international hold. Such differences as exist however, seem to me to be matters of degree.

"I think all segments of the oil industry in the United States can agree on the principles. First, for strategic reasons, imports of oil into the United States should not unduly curtail the domestic industry. It is agreed, I believe, that we in the United States are consuming oil at an extremely high rate in relation to the proved reserves which we have within the country.

"I think the question boils down to one of the extent to which we should rely on our own indigenous supply in the event of a major conflict. If we anticipate a purely defensive war fought at the border of the United States, indigenous and nearby supplies of our own may be the only ones available to us, but by the same token much less oil would be required than in any overseas war."

B. Brewster Jennings, president of Socony-Vacuum Oil Co., Inc., in a speech to the Economic Club of Detroit.

Operators Must Be Rewarded

"The vast petroleum resources of the Rocky Mountains have been integrated into North America's over-all petroleum mobilization picture . . . These petroleum resources . . . are essential to the state of ever-readiness which must be maintained. Privately man-

It takes rugged, dependable truck winches to move today's portable draw works, power units and masts. You are always sure and safe when your trucks are equipped with BRADEN WINCHES. They are made in capacities from 3,000 to 100,000 pounds.

The easy-to-operate BRADEN OIL-COOLED, FULLY ADJUSTABLE, AUTOMATIC SAFETY BRAKE assures operator of keeping the load always under perfect control.

BRADEN WINCHES are Standard of the Oil Industry.

See Your Dealer or write to factory for information.

BRADEN WINCH COMPANY
P. O. Box 547, Broken Arrow, Oklahoma

BRADEN Winches

HOLD ANY PACKER DOWN

. . . With a Guiberson Hydraulic Anchor

The Type "H1" Hydraulic Anchor is recommended for use with all Guiberson production-type packers — or any other comparable production-type packer — as a positive means of holding the packer and tubing down while the well is pressured below the packer, as in acidizing or formation-fracture processes. It is also recommended for use in anchoring the tubing and packer in gas or water injection wells where the tubing pressure will exceed the casing pressure. The "H1" can be effectively used as a Hydraulic Anchor to keep the tubing from "breathing" in pumping wells having low working fluid levels.

Simplicity of design and completely automatic operation make the "H1" exceedingly easy-running, easy-pulling — it may even be run upside down without the slightest effect on its operation. Case hardened piston slips in Monel inserts assure positive action and maximum corrosion resistance. Piston slips operate independently and provide equal distribution of gripping force against the casing I.D. with no localized high pressure areas. This, coupled with a limited piston slip stroke, positively precludes swaging or damaging casing in any way. Piston slip gripping area is 100% effective in any weight casing within the anchor size range. "H1" anchors are individually tested and will hold any pressure the tubing will stand.

TYPE "H1"

THE
GUIBERSON
CORPORATION
ESTABLISHED 1919 • DALLAS, TEXAS, U. S. A.
Sold By Leading Oil Field Supply Stores Everywhere

aged industry has come forth again with progressive, modern engineering accomplishments which adds strategic strength to our nation.

"There must be continuance of incentives in order to provide every operator with adequate financial rewards for the high risks involved and for the increasingly high costs of exploration and development."

Senator Hugh Butler of Nebraska, speaking at the dedication of the Platte pipe line, Casper, Wyo.

Lots of Oil, But No Money

"Returning from exile, the shah of Iran has revealed that his oil-rich kingdom is bankrupt and needs relief so urgently that it is prepared to accept help from any source. That admission will cause little surprise. Indeed, the amazing thing is that the shah's enemy, Mohammed Mossadegh, was able to keep the structure of government intact as long as he did, without the Anglo-Iranian oil royalties. But his feat offers neither precedent nor comfort for the shah.

"The fundamental difficulty, however, stems from the fact that since the nationalization of the Anglo-Iranian company's properties the West had made good the loss of this particular Middle Eastern oil from a number of other areas, so that it no longer requires Iran's supply but, on the other hand, neither can it afford to let that supply go to the Soviet Union."

Editorial in the Kansas City Star.

CALENDAR

SEPTEMBER

6-11 American Chemical Society, national meeting, Conrad Hilton Hotel, Chicago.

9-11 Pacific Coast Gas Association, San Francisco.

11-12 Association of Desk and Derrick Clubs of North America, annual meeting, Cosmopolitan Hotel, Denver.

13-16 American Institute of Chemical Engineers, Fairmont and Mark Hopkins hotels, San Francisco.

15-16 American Petroleum Institute, executive committee, Greenbrier Hotel, White Sulphur Springs, W. Va.

16-18 National Petroleum Association, annual meeting, Hotel Traymore, Atlantic City, N. J.

21-22 Natural Gasoline Association of America, fractional analysis seminar, Texas Hotel, Fort Worth.

21-25 Instrument Society of America, national instrument conference and exhibit, Sherman and Morrison hotels, Chicago.

22-25 Corrosion short course, Texas A. & M. College, College Station, Tex.

24-25 Western Petroleum Refiners Association, regional meeting, Henning Hotel, Casper, Wyo.

27 Institute of Gas Technology, annual meeting, Chase Hotel, St. Louis.

27-30 American Society of Mechanical Engineers, annual conference, petroleum division, Rice Hotel, Houston.

Sept. 27-Oct. 2 American Society for Testing Materials, Committee D-2 on petroleum products and lubricants, Shoreham Hotel, Washington, D. C.

28-29 Independent Natural Gas Association of America, Shamrock Hotel, Houston.

28-30 American Society of Mechanical Engineers, Petroleum Division, annual conference, Rice Hotel, Houston.

Sept. 30-Oct. 2. American Association of Petroleum Geologists, Mid-Continent regional meeting, Masonic Building, Wichita.

Sept. 30-Oct. 2 National Association of Corrosion Engineers, Permian Basin section, biannual field tour, Lincoln Hotel, Odessa, Tex.

OCTOBER

1-2 Mid-Continent Oil and Gas Association, Louisiana-Arkansas division, annual meeting, Roosevelt Hotel, New Orleans.

4-6 American Association of Oilwell Drilling Contractors, thirteenth annual meeting, Cosmopolitan Hotel, Denver.

5-7 Petroleum Electric Power Association, silver anniversary meeting, Muehlbach Hotel, Kansas City.

6-7 Texas Mid-Continent Oil and Gas Association Rice Hotel, Houston.

7-9 National Association of Corrosion En-

"I should have used a BERYLCO Safety Tool!"

Berylco Safety Tools are sold by leading industrial distributors. Write **THE BERYLLIUM CORPORATION,** Dept. 31, Reading 15, Pa., for a complete catalog and the name of the distributor nearest you.

ECONOMICAL answers to industrial problems—a few of which are shown on these pages—call for specialized *facilities* and years of *experience*.

Here at Alco you will find a large measure of both. You will find experience gained through many years of designing and fabricating heavy metal equipment for petroleum, chemical, power and manufacturing companies all over the world.

You will find modern equipment and machines, many of them designed and built by Alco, capable of meeting almost every conceivable type of metal-fabricating requirement—facilities operated by skilled craftsmen, and applied by designers and engineers fully aware of industry's needs.

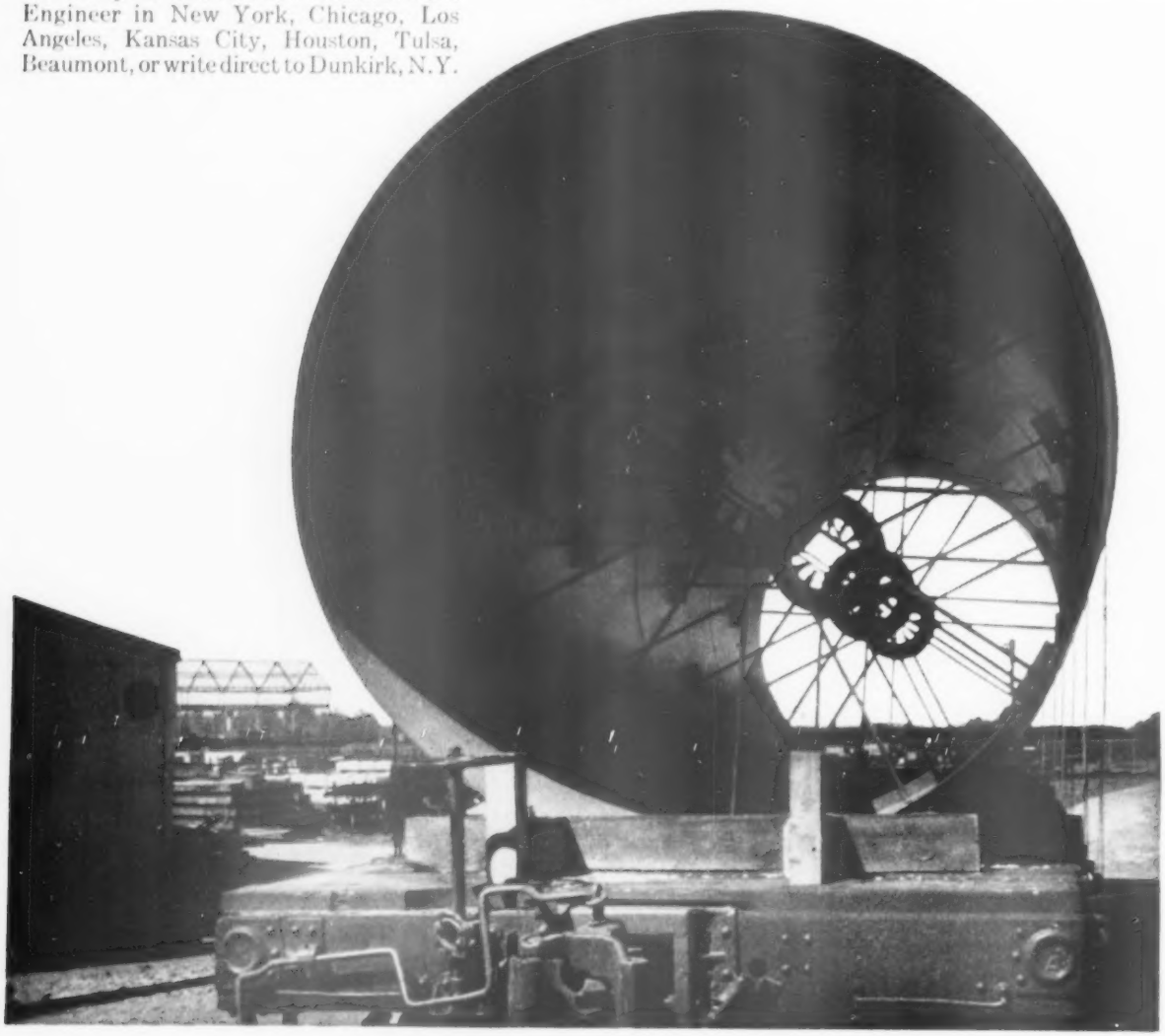
If you have a difficult metal-fabricating problem—a problem that challenges the imagination, that points to new equipment or offers new opportunities to cut production costs—we invite you to let Alco's facilities and experience produce the answer.

Contact your nearest Alco Products Sales Engineer in New York, Chicago, Los Angeles, Kansas City, Houston, Tulsa, Beaumont, or write direct to Dunkirk, N.Y.

ALCO facilities

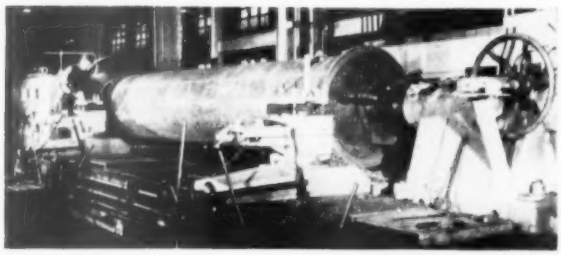
Answers to

TUNNEL INTERLININGS furnished by Alco in cold-rolled, carbon-silicon steel sections 40 ft long and 10 ft 6 in. in diameter will reinforce the outlet end of New York City's new $44,000,000 deep-rock East Delaware Water Supply Tunnel. Held to close dimensional limits, electric fusion welded throughout, they are the latest of many special piping sections fabricated over the years by Alco for New York water supply projects.

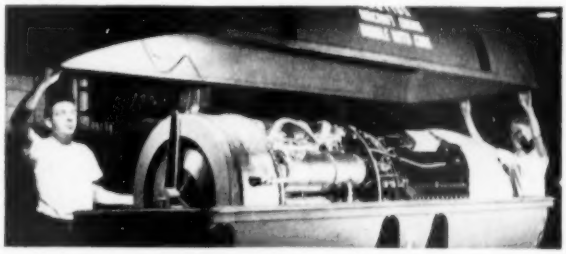


and experience produce...

New Industrial Problems



GIANT LATHE at Alco's 31-acre Dunkirk plant finishes and faces both flanges simultaneously on steel pipe up to 41 in. in diameter! Special machines like this, many of them Alco designed and all guided by the skilled hands of veteran craftsmen, help Alco solve the toughest of metal-fabricating problems.

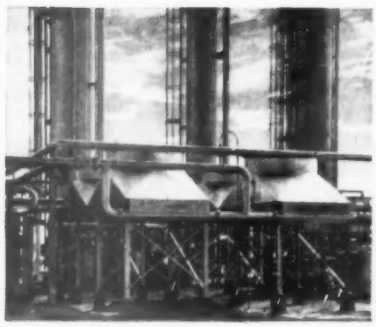


STEEL "CANS" FOR JET ENGINES, mass-produced by Alco, are carefully engineered to meet strict Air Force specifications. Example: they must "provide a barrier against the entry of water, dust, air and moisture *without* the aid of separately applied sealing compounds or materials."

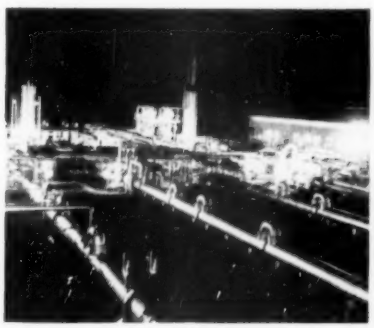
ALCO

ALCO PRODUCTS DIVISION

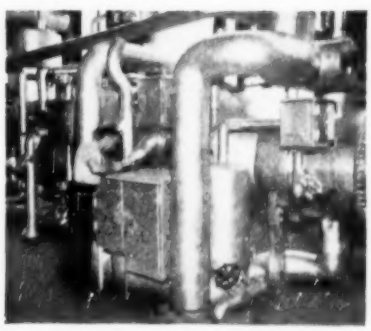
AMERICAN LOCOMOTIVE COMPANY • DUNKIRK, NEW YORK



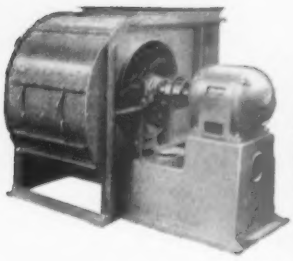
"UNI-BUNDLE UNITS," with their specially fabricated steel headers, demonstrate the versatility of Alco Aircoolers. Vertical partitions welded in the headers allow several different vapor or liquid streams to be handled in a single tube-bundle. Here, for example, at a large Southwestern natural gasoline plant, the Alco Aircooler at right not only cools the oil but also condenses the overhead vapor from the stream.



"TRAIN" HEAT EXCHANGERS, designed and built of nickel steel by Alco for the Tennessee Gas Transmission Company's new gas processing plant (the world's largest) at Gabe, Kentucky, helped cut both installation and operating costs. Their flange-to-flange construction minimized the amount of connecting piping required, while their huge size (42 in. in diameter, 150 ft long) assured maximum processing efficiency.



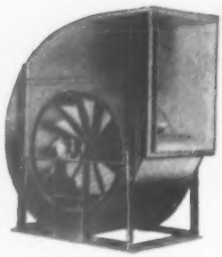
SPECIAL ALCO FLEX-TUBE EVAPORATORS at the Carolina Power and Light Company's new 150,000-kw plant at Goldsboro, N. C., produce vapor containing not more than 0.5 parts per million of mineral solids, hold make-up to less than one-half of one per cent. With its patented Flex-Tube construction, this Alco evaporator offers industry a positive-acting thermo-mechanical descaling device for straight-tube installation.



DRAFT FANS

"Buffalo" mechanical Draft Fans are helping turn out low cost steam in plants and major utility stations everywhere.

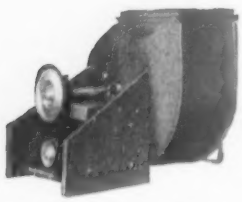
BULLETIN 3750



LIMIT-LOAD FANS

"Buffalo's" most widely used ventilating and air conditioning fans. 600 to 500,000 cfm capacities. Quiet, non-overloading, efficient.

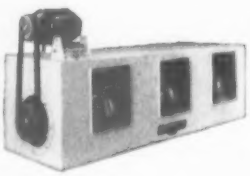
BULLETIN 3737



BELTED VENT SETS

Non-overloading ventilating fans for duct or free air delivery. Extra quiet.

BULLETIN 3720



SHORTBOY VENTILATING SETS

Quiet, efficient, vibration-free fans. Wheels mounted on hollow shaft.

BULLETIN 3701

THE FAN for your JOB IS ON THIS PAGE

"Buffalo" Fans give "extras" in performance for two reasons: First, the line is so complete that you can pick — with mathematical accuracy — the fan to give you best possible results on almost any air moving job you could name. Second is the "Q" Factor, or inbuilt quality that "Buffalo" engineers have always insisted on. Why not have us mail you Bulletins on the right fans for your air job — from the complete line shown here?

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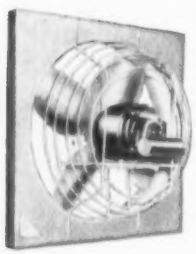


New! NV-BREEZO FANS

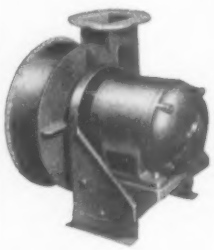
Their specially shaped four-blade wheel gives high efficiency even against system pressures of 1/4" and 1/2". 8" to 24" sizes.

BULLETIN 3865

New! BELT-AIR FANS

Quiet, sturdy fans to move a lot of air at negligible cost. Heavy-gauge die-stamped blades and panel.

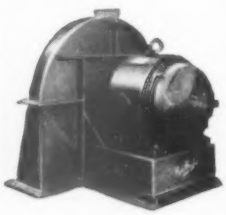
WRITE FOR BULLETIN



"CB" PRESSURE BLOWERS

Up to 2 1/4 psi, single stage with these husky, space-saving units!

BULLETIN 3553



"CC" PRESSURE BLOWERS

In sizes for up to 4 psi, and capacities up to 75,000 cfm. Complete range of sizes, extra heavy-duty construction.

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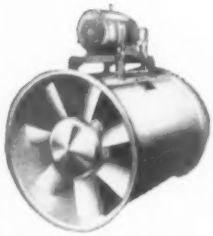

AXIAL FLOW FANS

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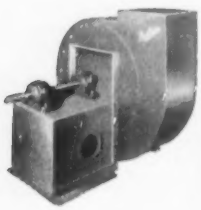
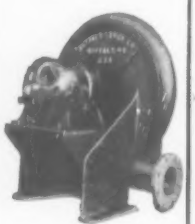
BULLETIN 3533



INDUSTRIAL EXHAUSTERS

All-welded for strength and high efficiency. With air or material wheels.

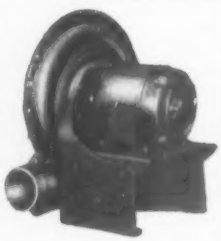
BULLETIN 3576



"RE" BLOWERS - EXHAUSTERS

For pressures up to 40" of water; 50 to 1600 cfm. Furnace blowing, line boosting.

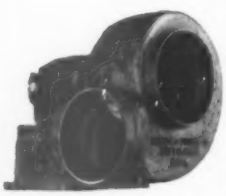
BULLETIN 3014



"E" BLOWERS - EXHAUSTERS

For low to medium pressures and volumes in draft, cleaning, line boosting.

BULLETIN 3014



BABY CONOIDAL FANS

Adjustable discharge, compact design, multi-blade rotors make these fans ideal for many small jobs.

BULLETIN 3576

VOLUME FANS

Rugged blowers-exhausters with cast iron housings and dust-proof ball bearings for any job up to 10" s.p.

BULLETIN 3615

gineers, south central region, Mayo Hotel, Tulsa.

8- 9 California Natural Gasoline Association, annual fall meeting, Ambassador Hotel, Los Angeles.

11-17 Oil Progress Week.

12-16 Short course on cathodic protection, University of Illinois, Urbana.

16-18 New Mexico Geological Society, fourth annual field conference, El Paso, Tex.

19-21 American Institute of Mining and Metallurgical Engineers, petroleum branch, fall meeting, Dallas.

19-20 Independent Petroleum Association of America, annual meeting, Texas Hotel, Fort Worth.

19-23 National Safety Congress, annual meeting, Hotels Conrad Hilton, Congress, Harrison, and Sheraton, Chicago.

21-23 Gulf Coast Association of Geological Societies, third annual convention, Captain Shrene Hotel, Shreveport.

22 American Institute of Chemical Engineers, New York section, symposium, Hotel New Yorker, New York.

22-23 Western Petroleum Refiners Association, regional meeting, Garrett Hotel, El Dorado, Ark.

23 Natural Gasoline Association of America, regional meeting, Blackstone Hotel, Tyler, Tex.

26-28 National Lubricating Grease Institute, Edgewater Beach Hotel, Chicago.

26-29 American Gas Association, annual conference, Kiel Auditorium, St. Louis.

27 Association of Consulting Chemists and Chemical Engineers, Inc., annual meeting, Hotel Belmont Plaza, New York City.

28-30 Seventeenth Technical Conference on Petroleum Production, Mineral Industries Building, Pennsylvania State College, State College, Pa.

29-31 Rocky Mountain Oil and Gas Association, annual convention, Cosmopolitan Hotel, Denver.

NOVEMBER

3- 4 Society of Automotive Engineers, national diesel-engine meeting, Conrad Hilton Hotel, Chicago.

5- 6 Society of Automotive Engineers, national fuels and lubricants meeting, Conrad Hilton Hotel, Chicago.

5- 6 American Association of Petroleum Geologists, Pacific section annual meeting, Hotel Biltmore, Los Angeles.

9-11 Geological Society of America, annual meeting, Royal York Hotel, Toronto, Ont.

9-12 American Petroleum Institute, annual meeting, Conrad Hilton Hotel and Palmer House, Chicago.

12-13 Society of Exploration Geophysicists, midwestern meeting, Adolphus Hotel, Dallas.

19-20 National Association of Corrosion Engineers, western region, fall conference, Biltmore Hotel, Los Angeles.

19-20 Annual Instrument Short Course, Los Angeles Harbor Junior College, applied technology division, Wilmington, Calif.

20 Natural Gasoline Association of America, regional meeting, Herring Hotel, Amarillo, Tex.

Nov. 29-
Dec. 2 American Society of Mechanical Engineers, Statler Hotel, New York City.

DECEMBER

1- 4 Corrosion conference, University of Oklahoma, Norman.

13-16 American Institute of Chemical Engineers, annual meeting, Hotel Jefferson, St. Louis.

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the texture-engineered composition cups

give constant high efficiency despite wear

...outlast other packings over 3 to 1!

YOU name the fluid and we can tell you of similar Darcova Pumcup installations that save plenty of dollars. And it's simplicity itself to change over to Pumcups.

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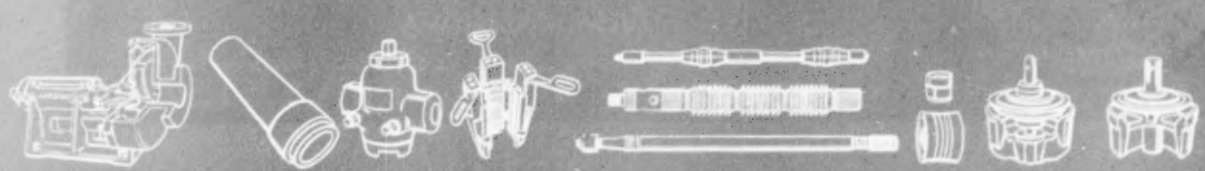

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JOURNAL
TULSA, OKLAHOMA

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JOURNALLY Speaking

Note to a First Clarinet

A NEW YORK clarinet player who writes books on clarinet playing is mad as—well, as mad as a clarinet player can get, at our circulation manager. The man's wife owns a piece of land in Oklahoma where some drilling is in progress, and he figured that by subscribing to our favorite oil publication he could find out how soon royalty checks would start pouring in. But he got the usual letter saying that he couldn't subscribe unless he were actually in the oil business. He came right back with this:

"I have just received your astonishing circular letter stating that you accept subscriptions only from individuals and companies actually engaged in some basic operational phase of oil. Having seen your magazine in the public libraries of many of the largest cities of the United States in the course of my musical travels, it is enlightening to know that they are all engaged in the oil industry.

"I had supposed that you were in the business of selling magazines. I believe your altruism to be unique in the publishing industry. I confess to the taint of commercialism in my own activities. I will gladly sell you a copy of my book for cash at any time."

Sorry, Mr. Musician, we don't want to buy a book on how to play the clarinet, but you raise some points which have puzzled many people, so we'll try to explain.

In the first place, we're not "in the business of selling magazines," at least not the way you think. We're in the business of serving the oil industry, and it doesn't do the oil industry any good to have our magazine read by thousands of people outside of, or barely on the fringe of, the oil industry. It doesn't do us a n y good either, because it costs us a lot more than $4 a year just to manufacture one additional copy every week. Our profit comes from selling advertising, and our advertisers aren't interested in people who never have anything to do with buying oil equipment.

So, you see, you are wrong about our "altruism," for we do have a "taint of commercialism." But this is not "unique in the publishing industry," as you assume. Almost all trade journals restrict their circulation to their particular industry, and for the same reason.

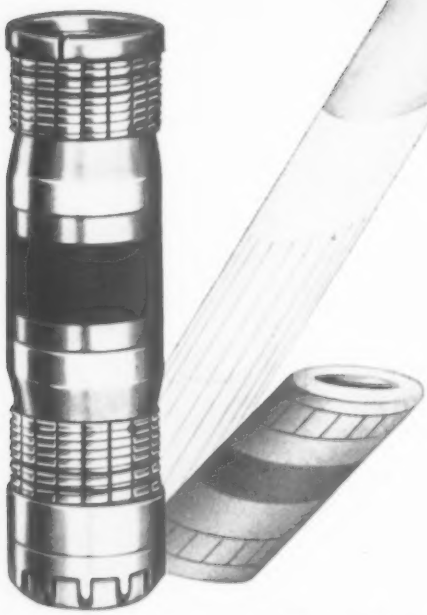
Now as for those libraries. We do make some exceptions and take $4 a year from a few persons and institutions not actually in the oil business. This includes some public libraries (but not all, by any means), certain select officials of state and federal governments, some trade associations, and a few other publications, oil writers, and the like. But the total list of such is a very small proportion of our entire circulation, and every one of them must satisfy our circulation manager that he has a real need for the Big Yellow Book and that in some way it will help the oil industry for him to get it. So far he has never been convinced that a clarinet player comes in this category.

One other thing, while we're at it. The Journal wouldn't serve your purpose, even if you could subscribe. We make no pretense of reporting on all wells being drilled and the development of every area. There are specialized regional services which do that. Except for summary statistics, we report only the most significant wildcats and the most interesting development trends, and the chances are slim that your wife's old homestead will include one of these. That's not altruism, either; we do know that we serve our readers best by that editorial policy.

Oil for Cracking

THE oil industry is going to get in trouble with Dick Tracy and the FBI if it doesn't curb its progress in making all kinds of new products. We just heard of a couple of new petroleum derivatives to prevent fingerprints. One covers metal to prevent fingerprints from showing, and the other will remove all fingerprints left on metal. They were designed to prevent corrosion damage to metal objects during manufacture and shipping, but we see no reason why they wouldn't work on other things, such as safes.

—*Henry D. Ralph.*



here's the long ...and the short

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For substantial savings in rig time... for dependable bridge plug performance

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on your next plug-back, or combination plug-back and perforating job

Good news on antitrust; oil's views are now welcome

OIL, more than any industry, has a vital interest in the study committee set up by the Department of Justice to see what can be done about adapting antitrust enforcement to the business facts of life.

For oil has always been a favorite whipping boy of trust busters, and oil cases have had a big part in shaping antitrust policy. It was the old Standard Oil case in 1911 that wrote the "rule of reason" into antitrust enforcement. And it was the Madison case in 1935 that took that rule out again.

Since the Madison case, business has not known where it stood. A course of action designed to benefit both consumers and competitors might bring a criminal indictment, and conviction hinges on whether the action fits into a rigid legal concept. Last year's "oil cartel" charges are a case in point.

The Sherman Act of 1890 flatly states that anything that restrains competition is illegal. Under a strict interpretation we probably could have no mass production or mass distribution, no big business, no oil conservation. Obviously, some rule of reason is needed. But there are serious dangers in letting administrative officials have complete discretion in judging the propriety, legality, and economic effect of business actions.

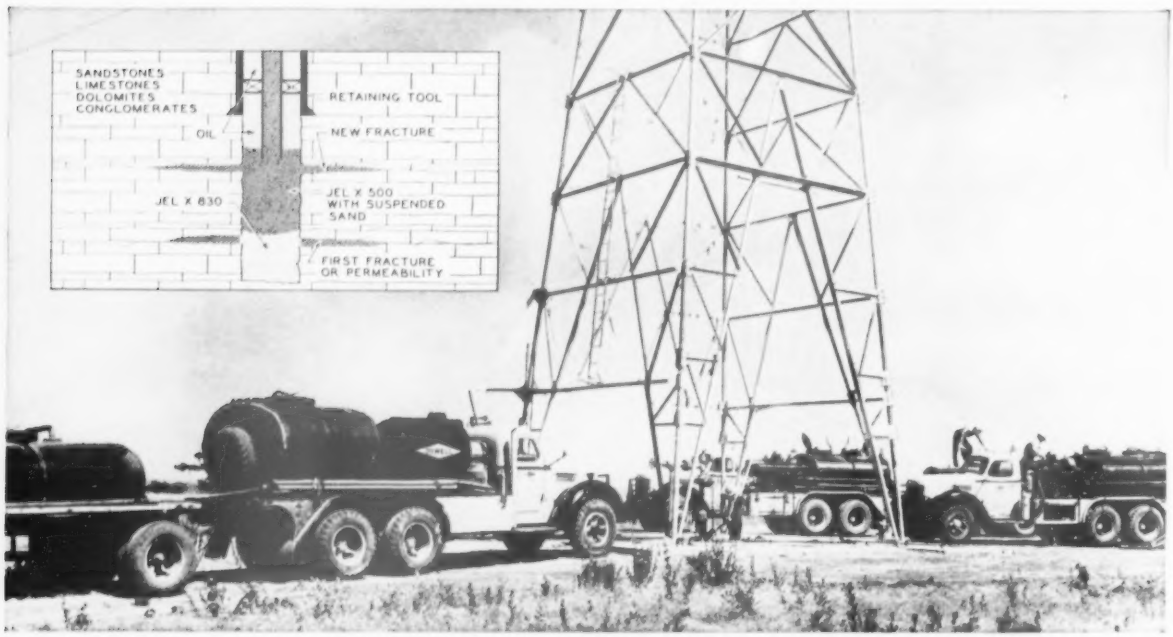
WHAT is needed is a "middle way." This, it is hoped, is what the new study committee will recommend. And the oil industry can be of great assistance, if it will, because of its long and varied experience with courts and competition in every phase of its activities.

- First we need a clarification of objectives: Not just competition for its own sake, but organization and practices which will give more people more goods at less cost. On such a yardstick the oil industry would measure high.
- Then, because no two industries operate exactly the same, rigid legal formulas of what is and is not undesirable restraint of competition should be dropped. Instead, both courts and enforcement officials should be instructed to test the reasonableness of an action under review in the light of the facts involved and the effect on the public interest.
- Finally, there should be some machinery through which industry can determine in advance whether a course of action proposed in good faith will be viewed by the Government as an illegal criminal conspiracy. This should be kept simple and flexible to avoid the absurd involvements of the NRA and Trade Practice Conference fiascos of the 1930's.

It is good that Government is asking business advice on the knotty problem of antitrust. Oil men now have a chance to state their views, and they can be helpful in forming a new policy.

FIXAFRAC—TEMPORARY PLUGGING SERVICE—AIDS IN MULTIPLE FRACTURING TREATMENT

Production boosted from 2.3 to 65 BOPD; Fixafrac used to divert Stratafrac stages into different zones



Initial production from this well, after acidizing, was 50 barrels of oil per day. It declined over an 18-year period until production had fallen to 2.3 BOPD.

At this point, the operator decided to call in Dowell to determine how to increase production. Dowell's recommendation: a multiple fracturing treatment consisting of 1500 gallons of Stratafrac material and 300 gallons of Fixafrac material.

Dowell engineers performed the service, using Dowell trucks, equipment and fracturing materials. As a result of the treatment, the well swabbed 3½ barrels of oil per hour for 7 hours, after treating materials had been recovered. On pump, the well produced 65 BOPD.

Fixafrac is a temporary plugging service used between stages of Dowell fracturing and acidizing treatments to divert treating fluids into different sections. The material used in Fixafrac service, Jel X 830, carries suspended solids which react after treatment causing the material to liquefy and flow back freely to the well bore. No jel-breaker solution is needed following the treatment.

If you would like to know more about Fixafrac service, or any of the many other Dowell oilfield services, call the nearest Dowell office or write to Tulsa, Dept. I-11.

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THIS WEEK

TEN YEARS OLD but setting new records is this cat cracker in the Baton Rouge refinery of Esso Standard Oil Co. Old PCLA-3, flanked by two other fluid cats in this shot, has just chalked up an annual-throughput record for a Jersey Standard Model II unit of 19,336,700 bbl. of fresh and recycle feed, an average of about 53,000 bbl. a day. Its highest daily rate was 68,300 bbl., reached in May, a tremendous throughput in view of its original design capacity of 15,000 bbl. Continuous expansion and bottleneck removals turned the trick. Similar expansion of existing units is common practice among refiners seeking to get the most value out of crude and is a factor in the present record yields of gasoline in the nation.

EXPLORATION.—Magnolia makes first discovery of oil in Black Warrior basin of Mississippi and Alabama. . . . Test is 18 miles from old Amory gas field and more than 100 miles from nearest oil production, in Pickins field. . . . ¶Rig, drill pipe, and associated drilling, camp building, and other equipment readied at Long Beach for movement to Alaska, where Phillips and Kerr-McGee are in early stages of major exploratory effort to determine oil possibilities of million-acre block on southeastern coast. . . . ¶Anglo-Iranian official says company now considering entering exploratory and production operations in Alberta. . . . Decision to be made soon on basis of year-long survey of Canadian possibilities. . . . ¶Stanolind submits highest bids for five offshore tracts in first Texas sale of offshore leases in nearly 6 years. . . .

REFINING.—Suntide Refining Co.'s president, Floyd L. Martin, fires boilers for test run of crude and vacuum units at company's new $16,000,000 Corpus Christi refinery. . . . Completion of cat cracker, gas concentration plant, and polymerization and alkylation units to follow in quick succession. . . . ¶PAD indicates that present restrictions on the use of alkylate in automotive gasoline will be retained indefinitely. . . . ¶Bay Petroleum completes multimillion-dollar expansion and modernization program boosting crude-charge capacity of its Denver refinery from 6,500 bbl. daily to about 12,000 bbl. daily. . . . New facilities include 3,528-bbl. fluid cat cracker. . . . ¶Sunray preparing to let contract for 5,000-bbl. Platformer at its Duncan, Okla., refinery. . . .

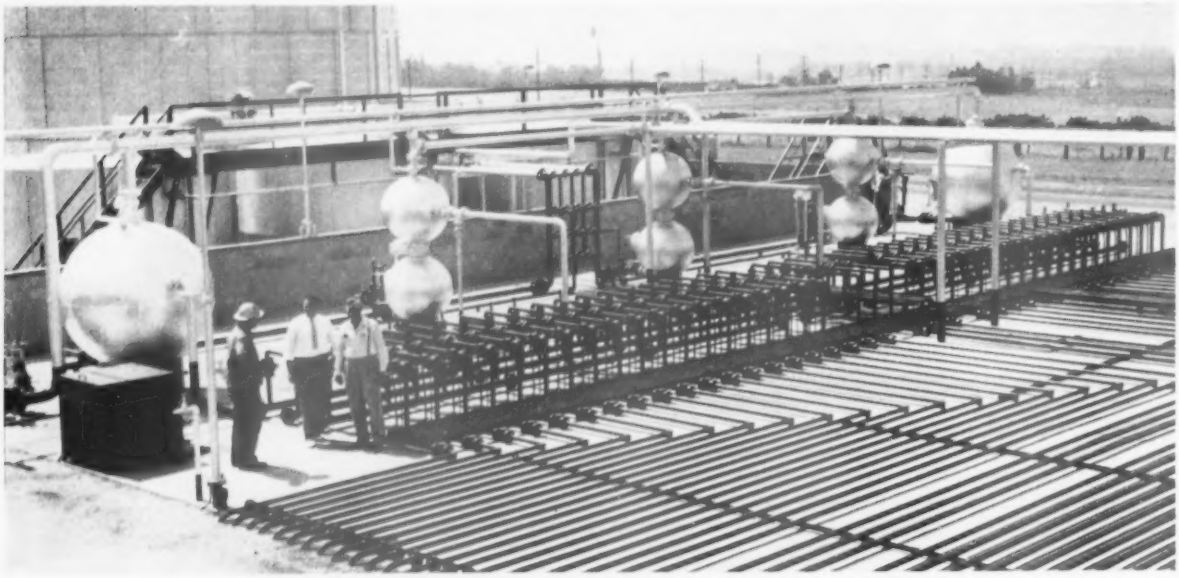
INTERNATIONAL.—Number of rotary rigs operating outside of U. S. hits new high. . . . South America records only decline in drilling. . . . Standard-Vacuum Oil Co. buys new headquarters' site outside New York City. . . . Esso Petroleum Co., Ltd., places new sulfur-recovery plant on stream at Fawley refinery near Southampton, England. . . . Houston drilling firm and Dutch interests organize contract drilling company at Rotterdam. . . .

GOVERNMENT.—Government to ask for bids this month for purchase or lease of synthetic-fuels demonstration plants. . . . Plants now being placed in standby status. . . . ¶Oil companies file answers to Government's antitrust charges which grew out of FTC study. . . . Joint operations abroad defended as necessary. . . . ¶ODM's Fleming indicates rapid tax amortization for new facilities will end soon for industries which have reached expansion goals. . . .

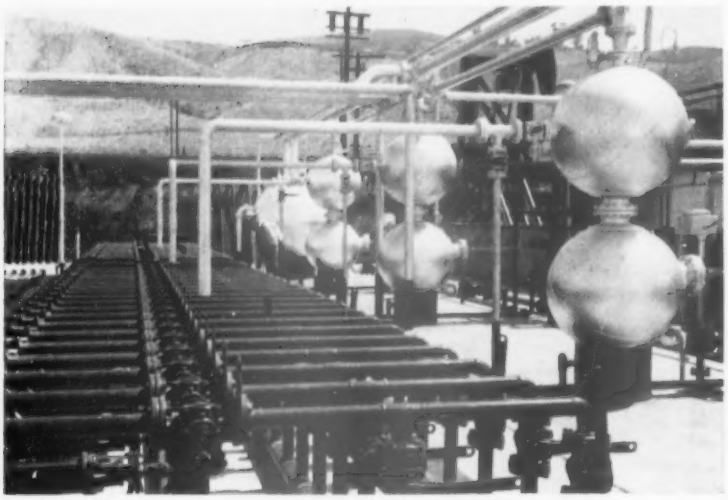
NATURAL GAS.—Export of about 62,000,000 cu. ft. daily of Gulf Coast gas to the Toronto, Ont., market area approved by FPC. . . . ¶Algonquin Gas Transmission starts deliveries in its New England market area after 2½ costly years of court battles and FPC hearings. . . . ¶FPC sides with Phillips Petroleum Co. in its effort to obtain a Supreme Court reversal of a lower court ruling that the company and other producers and processors of gas are subject to federal regulation, Doty tells compact. . . .

ACTIVITY.—Production of crude and lease condensate averaged 6,580,450 bbl. daily for week ended August 29, up 4,600 bbl. daily. . . . ¶Total well completions for the week dropped 10 wells to 1,010. . . . Wildcat completions totaled 215 compared with 255 for preceding week and 194 for same week last year. . . . ¶Rotary rigs operating in the United States increased 12 rigs for the week ended August 31 to 2,610. . . .

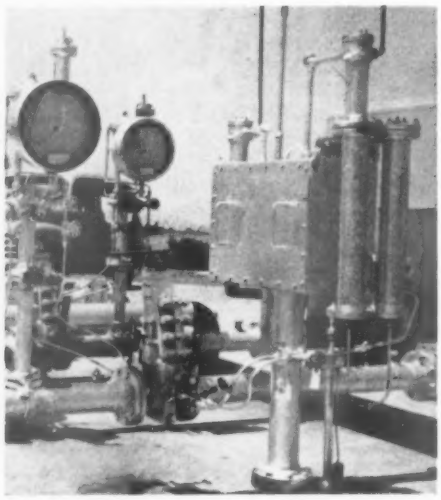
TRENDS.—Primary distillate inventories in Gulf-East Coast districts reached 62,766,000 bbl. on August 29 for a gain of 23.4 per cent over last year and 46.8 per cent over same week of 1951. . . . Distillate stocks in these districts are only 1,200,000 bbl. under last year's peak and are 8,500,000 bbl. over the highest level reached in 1951. . . .



OVER-ALL VIEW of Shell's new Brea Canyon installation near Los Angeles.



LOOKING DOWN the switching manifold at the Brea Canyon tank farm. Air cylinder-operated three-way plug valves (at left) automatically switch a well to a test trap in response to preset time and sequence selector switches.



WET GAS from test separators is measured by meters (right) and recorded on printer counters on control panel.

Push-Button Field Tank Battery

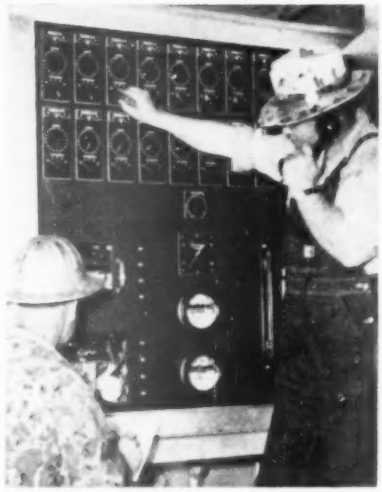
New Shell facilities at Brea Canyon field automatically separate, meter oil and gas output of individual wells

D. H. Stormont

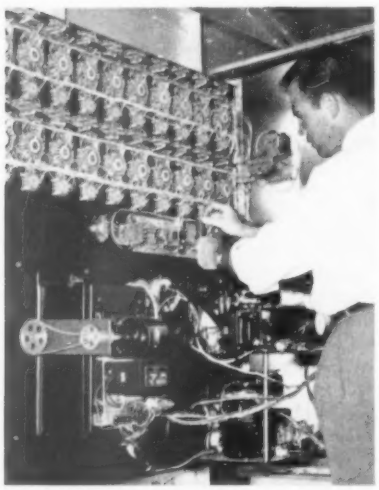
LOS ANGELES.—Heralding a "push-button" era in the separation and metering of oil and gas, Shell Oil Co. recently completed a fully automatic field tank battery at Brea Canyon field near here.

The new installation provides automatic facilities for production testing up to 40 individual wells, and as many as three wells can be manually tested for obtaining completion data. Several innovations in separating, metering, and recording individual well data make the installation the most modern in the industry.

How it works . . . Each of the 40 wells to be served by the farm can be tested in any order of sequence for periods of 4, 8, 12, or 24 hours. Governed by present time and sequence selector switches, production from a particular well to be tested is automatically diverted from the bulk oil and gas separators into a test separator for the predetermined test period. Switching is accomplished by air cylinder-operated three-way plug valves in the inlet mani-



ORDER in which 20 wells are tested and the duration of each test is preset on controls in the upper portion of the panel. Flow of other 20 wells is regulated by a second control panel.



MAJOR PART in design of installation was played by Bill Faulk, Shell engineer, shown here at rear of one of the two control panels. Upper portion contains the control switches, while the strip printer counters are housed below.

fold which are actuated by preset controls.

Wet gas is measured by wide-range flow meters as it leaves the test separator. Fluid is passed through a cut recorder which electronically determines the water cut of the crude. This information and the gross production is also recorded. Output of wells not on test is manually gaged in the shipping tanks.

Amount of oil and gas being produced by a well on test is measured on counters in two control panels and printed on strip charts together with the well code number every 4 hours. At the end of each test sequence the counters are automatically reset to zero, and the new well to be tested is indexed. A master switch permits interruption of any automatic-testing cycle to allow for manual gaging and sampling to check the meter and cut-recorder calibrations.

Storage . . . Storage facilities consist of three 250-bbl. test tanks, a 7,000-bbl. wash tank, and two 10,000-bbl. shipping tanks. The latter are equipped with bleeding devices which drain water from the tank bottoms every 6 hours, automatically shutting off when the water-oil interface is encountered.

Currently the farm is handling production from 24 wells, totaling approximately 7,000 bbl. of crude and 7,000 M.c.f. of gas daily. Balance of the 40-well capacity is to be filled under the current Brea drilling program. Similar automatic installations are either under construction or planned for several other Pacific Coast fields.

Pollution Regulated

Washington tackles problem before refineries are built

OLYMPIA, Wash. — The state of Washington has taken steps to prevent pollution of its waters from refinery waste before two major refinery construction projects get far past the planning stage.

The state pollution-control commission has already received commitments from both General Petroleum Co. and Shell Oil Co. for including facilities to care for waste material from planned refineries. General is building a $36,000,000 refinery in the vicinity of Ferndale and Shell a $75,000,000 plant near Anacortes.

"With the proper facilities provided, and if these facilities are continuously operated to their highest efficiences, the waste discharged from the oil refineries should not contain chemicals or oil in quantities which would damage aquatic life," the pollution-control commission commented in a recent bulletin.

"The commission will require a continuous analyses of these effluents as discharged into the waterways and reports of the results of such anyalsis," the bulletin continued.

The committee said it will require refineries to remove oil by separators and by facilities to break oil emulsions in the refinery-waste discharge. Sulfides and mercaptans must be removed by scrubbers and destroyed by combustion. Phenols must be recovered by distillation and any residual destroyed by an activated sludge process.

"Some of the undesirable sludges will not be allowed in the waste discharged into receiving waters," the commission declared. "Others which can be neutralized can be discharged into the other waste after neutralization."

Alaska Rig Readied

LST loading equipment for Phillips-Kermac oil search

LONG BEACH.—An LST loaded with 1,500 to 2,000 tons of equipment, including a complete drilling rig, will leave here this week for Alaska, where Phillips Petroleum Co. and Kerr-McGee Oil Industries, Inc., are in the initial stages of a major exploratory operation.

The rig will be used to drill the first of a series of wildcats to test a million-acre lease block in the Katalla-Yakataga area, along the southeastern Alaskan coast.

The rig last week was being assembled in Torrance, Calif., by Kerr-McGee personnel. The LST cargo also will include drill pipe, well-logging and associated drilling equipment, trucks, road-building equipment, and other materials needed for construction of a permanent camp in the remote and virtually uninhabitated area.

The LST will unload the equipment at the companies' temporary camp at the mouth of Carson Creek in Icy Bay, the eastern end of the 120-mile-long strip to be explored.

Work under way . . . Phillips at present has four surface-geology parties at work in the area. Much of the work is being done wth helicopters. Where the first wildcat will be drilled and when it will be spudded have not yet been announced.

The present operations mark the beginning of the first large-scale private search for oil in Alaska. It is being undertaken by the companies on a 50-50 basis, with Phillips as operator and Kerr-McGee doing the drilling.

The million-acre block consists of about 500 separate leases which were assembled by William T. Foran and Ben G. Gellenbeck. The contract under which Phillips acquired exploration rights requires the drilling of 12 wildcats over a period of 10 years, including 6 in the Katalla area and 6 in the Yakataga region *(The Oil and Gas Journal, February 16, page 94)*.

The contract also requires that two wells be drilled before June 30 1956 and that a total of $1,200,000 must be spent in exploratory work by that date.

First equipment for the operation was sent to Alaska early in July *(The Oil and Gas Journal, June 22, page 144)*. Since then an LSM has been beached in Icy Bay for use as a pier for unloading of equipment.

Court Rules for Monterey

LOS ANGELES. — Monterey Oil Co.'s right to construct a drilling island 1½ miles offshore from Seal Beach was upheld in the District Court of Appeal on August 28.

In over-ruling a Superior Court decision the court held that the state, which had joined with Monterey in its fight with the city, has exclusive jurisdiction over submerged ocean lands within 3 miles off the coast. Seal Beach had contended its police powers extended that far, that in erecting the $1,000,000 island Monterey was violating city ordinances prohibiting drilling.

Work on the 75-ft. diameter steel and concrete structure has been halted since late last year, when the city instituted criminal action against company officials for failure to obtain a building permit. Seal Beach reportedly will take the case to the state Supreme Court, delaying construction work even further.

Ohio Well Nears 20,700 Ft.

BAKERSFIELD, Calif. — Ohio Oil Co.'s deep test in Paloma field neared 20,700 ft. last week probing for the Point of Rocks sand in the Eocene and for its second world record—this time the world's deepest producer.

The wildcat set a new record for depth August 20 when it passed the 20,521-ft. depth set by Superior Oil Co.'s Sublette County, Wyoming, well in June 1949. The Superior well was later abandoned.

SOUTHWEST

L.P.G. Storage Cavity Begun

LEVELLAND, Tex.—Stanolind Oil & Gas Co. has started drilling into a Hockley County salt section to create a 100,000-bbl. underground L.P.G. storage cavity.

The cavity will be leached out of a salt section found between 2,330 and 2,800 ft. Brine will be disposed of in the Santa Rosa formation at 1,700 ft. The disposal well was started August 10.

The L.P.G. storage reservoir will handle the output of Stanolind's Slaughter field gasoline plant, but completion date for the cavity is indefinite. The Slaughter plant has a gas-processing capacity of 110,000,000 cu. ft. daily with a recovery of 2,883 bbl. of 12-lb. gasoline, 2,690 bbl. of butane, and 1,477 bbl. of propane daily. El Paso Natural Gas Co. has contract for residue gas.

Commingling Permit Asked

AUSTIN.—Shell Oil Co. has asked the Texas Railroad Commission for a dual-completion permit and authority to commingle oil produced from both the Upper and Lower Paluxy zones in its J. B. Goldsmith Well No. 11, Quitman fields area, Wods County.

The well was completed as a dual producer in December 1945, but the commission has previously refused to grant a dual permit. D. D. Paynter of Shell said the Upper Paluxy was perforated from 6,134 to 6,150 ft. and from 6,178 to 6,210 ft. for production through the casing annulus. He said it flowed at a daily rate of 817 bbl. through a ¼-in. choke at 600 psi. in a January 1946 test.

The lower Paluxy, for production through the tubing, was perforated from 6,308 to 6,320 ft. and flowed 422 bbl. through a ¼-in. choke with a gas-oil ratio of 91:1 and a flowing tubing pressure of 335 psi. in a test made about the same time.

Paynter maintained the two zones are not in communication and presented cross sections to show the well is separated from other Quitman field wells by a fault with a 325-ft. displacement.

Pecos County Flood Planned

FORT STOCKTON, Tex. — Burk Royalty Co. will water flood the Queen sand underlying five leases in Masterson field of Pecos County with a 5-spot injection plan that is expected to yield an additional 3,000 bbl. of oil per acre.

The plan, recently approved by the Texas Railroad Commission, calls for injecting 400 bbl. of water a day at 175 psig. into the 20-ft.-thick sand at about 1,425 ft. Burk Royalty's 1, 2, 6, and 9 Masterson wells will serve as injection wells.

The stratigraphic-type reservoir has about 200 productive acres and has been producing by means of a depletion-type drive since the field was discovered in 1934.

Texas Market Study Slated

AUSTIN. — A three-man independent oil producer committee will make a study of Texas crude-oil markets to see if shut-in Texas producers are losing their markets because of unregulated flow of oil abroad and in other states.

Maston Nixon, Corpus Christi, was named chairman of the committee by M. D. Bryant, president of the Texas Independent Producers and Royalty Owners Association. R. L. Foree, Dallas, and Guy I. Warren, Corpus Christi, were named members of the committee. The group has been asked for a report before the state-wide hearing of Texas Railroad Commission September 18.

South Bolivar Flood Asked

AUSTIN. — The Texas Railroad Commission has been asked to grant permission for water flooding the first Strawn sand underlying 7 leases in South Bolivar field of Denton County.

M. C. O'Neal spokesman for 10 applicants, said production from the leases now averages less than 5 bbl. daily. He anticipates recovery of an additional 2,500 bbl. per acre from the 350 productive acres in the reservoir if the project is approved.

O'Neal said plans call for injection of 200 bbl. of water a day at a maximum pressure of 1,200 psi., through each injection well. Salt water from the Johnson (second Strawn) sand will be used. The first Strawn is found at a depth of 1,500 ft. in this area and averages 10 ft. in thickness.

Drilling Limitations Dropped

AUSTIN. — The Texas Railroad Commission has rescinded four orders issued in 1951 which restricted drilling in order to conserve steel during the shortage.

The commission pointed out "that such steel products are now readily available, and that there is no longer a need to continue in force said orders."

Withdrawn were Special Orders No. 20-20, 348; No. 20-20, 349; No. 20-20, 434; and No. 20-20, 457.

Corrosion Tour Planned

ODESSA, Tex.—Effects of corrosion on oil field equipment will be studied during this year's tour planned by the Permian Basin Section of the National Association of Corrosion Engineers. The tour will be September 30-October 2 in the Odessa area. Headquarters will be the Lincoln Hotel in Odessa.

Damage caused by scale, corrosion, peeling of protective coatings, and paraffin buildup will be among the things pointed out on field and refinery equipment in place.

Engineers from 38 states and three foreign countries attended a similar tour 2 years ago.

Gas Export Approved

First shipment to Canada authorized by FPC; T.G.T. will expand facilities to deliver at boundary to Niagara Gas

FIRST major export of United States gas to Canada awaits only the completion of the necessary lines.

A plan for carrying Gulf Coast gas north to the Toronto, Ont., market area was approved August 27 in Washington by the Federal Power Commission.

Under the plan, Niagara Gas Transmission, Ltd., would buy the gas in the Gulf Coast area, turn it over to Tennessee Gas Transmission Co. for transportation north, and accept delivery at the U. S.-Canadian boundary near Niagara Falls. Niagara then would carry the gas to Consumers Gas Co. for distribution in the Toronto area. Niagara is owned jointly by Tennessee and Consumers.

The commission authorized the export of an average of 62,000,000 cu. ft. daily but not more than 115,600,000 cu. ft. per day to a maximum of 22,600,000,000 cu. ft. annually.

The same order authorized Tennessee to transport a maximum of 49,728,000 cu. ft. per day of gas from Sheridan field, Colorado County, Texas, for delivery to Iroquois Gas Corp. at points in Pennsylvania and New York.

Construction . . . To carry out the program Tennessee will lay a total of approximately 904 miles of pipe line and install 38,800 compressor horsepower to increase the capacity of its system by 111,690,000 cu. ft. to 1,728,390,000 cu. ft. per day. In addition, the company will be able to deliver an additional maximum of 210,936,000 cu. ft. of gas daily from its Hebron, Pa., storage area. Total estimated cost of the project is $91,718,000.

The new construction includes 571 miles of 30-in. main line from Station No. 507 near Kinder, La., to Station No. 87 near Portland, Tenn., via Yazoo City, Miss.; 67 miles of 30-in. loop lines in Texas and Louisiana; 63 miles of 26-in. loop lines in Ohio and Pennsylvania; 45 miles of 20-in. line from Buffalo to the Canadian border; 58 miles of 20-in. line in Louisiana from Tennessee's present system on the Gulf Coast to Station No. 507, and 100 miles of miscellaneous laterals in Texas. Three new stations with 21,280 compressor horsepower will be constructed, and the rest of the compressor units will be installed in existing stations. The new stations include a 5,280-hp. facility near Yazoo, 10,000 hp. near Morehead, Ky., and 6,000 hp. near Findley Lake, N. Y.

The company will transport 61,914,000 cu. ft. of gas per day for Niagara from fields in southern Louisiana and Aransas County, Texas. When Niagara's daily requirements drop below that figure, the difference will be stored by Tennessee for later delivery. Thus, when peak-day deliveries reach the maximum, the 61,914,000 cu. ft. will be delivered directly with the remainder coming from storage.

Conditions attached to the authorization will require Tennessee to file an application by next January 1 for authority to dispose of the unallocated capacity of approximately 131,570,000 cu. ft. of gas per day which it will have upon completion of all its authorized facilities. The order specifies that the export of gas shall not commence until a presidential permit is issued authorizing the construction, operation, and maintenance of the pipe-line facilities at the Canadian border.

Contacted in Houston, a Tennessee Gas spokesman said the company would release no information on plans for construction until it receives the FPC certificate of convenience and completes a thorough study of the final decision.

Volume termed minor . . . Export of domestic natural gas was authorized by the commission with Commissioner Nelson Lee Smith dissenting and Commissioner S. L. Digby not participating.

In its formal order, issued last week, the commission recognized the existence of a large unsatisfied market for natural gas in Canada but wished to make it plain "beyond all peradventure of doubt" that it is not undertaking, in authorizing exportation, to supply any market or area beyond the volumes now authorized. Future applications for additional gas for Canada will be considered on their merits.

Dismissing a contention that the exportation will have a tendency to deplete natural-gas reserves required to satisfy the growing domestic demand, the commission took the position that the export of approximately 440 billion cubic feet over a 20-year period "can have no material effect on the total natural-gas reserves in the United States." As a matter of fact, the FPC pointed out, exports to Mexico which have been authorized in the past greatly exceed the amounts to be exported to Canada.

"Finally," the commission asserted, "there are no facts upon this record which justify the conclusion that customers now served by Tennessee or along its facilities would be deprived of any gas service by reason of such export."

Dissenting opinion . . . Smith, in dissenting, charged that the plans to export gas to Canada and transport gas for hire for Iroquois had met the stat-

Shell Installs New Vapor-Recovery Equipment

The latest type of vapor-recovery device, a 150,000-cu. ft. Horton Vaportank, is inspected at Shell Oil Co.'s Dominquez, Calif., refinery. The Vaportank, designed by Chicago Bridge & Iron Works, is equipped with an internal diaphragm of nylon and synthetic rubber. The diaphragm rises or falls as two connected 80,000-bbl. storage tanks release or draw in vapors, and thereby prevents essentially all loss to the atmosphere. Looking over the new tank, which is 64 ft. high by 66 ft. in diameter, are (left to right) D. L. Cleveland, Shell's department manager, C. V. Kanter, Los Angeles County research engineer; R. W. McOmie, refinery manager; Gordon P. Larson, director of the county's Air Pollution Control District; and S. J. Meisenburg, refinery superintendent.

utory tests of being required by the public convenience and necessity of being consistent with the public interest.

While there is no assurance that this particular gas would otherwise be available to Tennessee and its customers, Smith declared, "it nevertheless follows that if its exportation were precluded that gas would of necessity be subject to utilization in the United States."

Smith pointed out that the Canadian authorities made no official representations for or against the project, adding "to what extent this may be due to the pendency of the Trans-Canada proposal to carry gas from the western to the eastern provinces, which is admittedly beyond our jurisdiction, can be only a matter of conjecture" *(See "Canada" in this issue).*

"Gas for hire" attacked . . . Smith also attacked the idea of permitting the transportation of gas for hire. Under the FPC order, he said, Iroquois will pay $1,361,278 more per year, or 7.6 cents more per thousand cubic feet than it would if it purchased the gas directly from Tennessee, and "just why the commission should permit Iroquois and those whom it serves to be penalized by this amount . . . is by no means clear to me."

As a final point, Smith said attention should be called to dangers which may arise in connection with arrangements for the transportation of gas for hire. Among other things, he cited the potential harm to the public interest generally if there were "any considerable migration of desperate gas distributors into the gas-producing fields in an effort to acquire and preempt reserves which they need to serve their customers but are unable to secure through their ordinary pipe line sources of supply."

The "impacts" of such purchases and prices—"through their activation of certain types of 'favored-nation clauses'"—upon segments of the public far removed from any direct connection with the natural-gas systems and supplies immediately concerned "is something to which I think the commission should soon give searching consideration," Smith said.

Antitrust Answers

Socony-Vacuum denies monopoly-conspiracy charge, tells court competition has been the rule in postwar operations

NEW YORK.—Competition, and not any lack of it, has been the main motivating force behind the actions of Socony-Vacuum Oil Co., Inc., in the foreign fields since the end of World War I, the company told a federal court here last week.

The history of Socony's continuous effort to develop crude production and refining to serve the foreign markets with which it was left after the 1911 Standard Oil dissolution were reviewed in a 63-page answer filed by the company here in reply to the Justice Department's antitrust complaint against five major American oil companies operating abroad.

The case is that which was originated in Washington about a year ago following the Federal Trade Commission's staff study of an alleged international oil cartel. At that time, the Government called a grand jury to hear charges of criminal violations. Later these proceedings were dropped, the civil suit filed, and the case transferred to New York.

Socony-Vacuum denied that the various agreements under which it acquired foreign production, including the Iraq Petroleum stock interests, the Aramco purchase, the now-defunct Middle East pipe-line project, and the Colpet partnership in Colombia, were made as a part of any over-all plan to monopolize or restrain the international oil trade.

On the contrary, Socony-Vacuum said, these acquisitions came from its own independent determination of what should be done to deal with a critical competitive situation. Without advantageously situated production and refining the company would have been forced out of business in many important areas by strong and often politically favored foreign competition.

Joint activity required . . . Joint operations abroad—a characteristic of the foreign industry around which the Government builds much of its antitrust case—are often necessary because some other company has already tied up all the promising government-owned subsoil rights. Furthermore, the tremendous capital requirements and risks involved often call for joint participation of several companies, the company declared.

Although Socony said the Iraq Petroleum interest helped it remain in certain markets it would otherwise have lost, during its 25 years of participation Socony's net earnings after taxes from its sales of crude derived through Near East Development, which holds the American interest in I.P.C., have amounted to $37,330,000 while during the same period it has expended through Near East Development a total of $67,754,000. Along the same line, Socony said it is still some $10,000,000 short of having recouped its investment in the Barco operation in Colombia.

The company said it believed, from a business standpoint, that arrangements with competitors in the local market of a foreign country involving price fixing or sharing of the market are not in its best interests. However, in some cases abroad, they are not only lawful but actually required by pressure from the local government.

As for foreign marketing, Socony also made the point that a continually rising world oil production and reductions in the real price of petroleum products to consumers illustrate events stemming from a dynamic competitive industry, rather than one fettered by monopoly and restraint of trade.

Other answers similar . . . The other four companies which are defendants in the case—Gulf Oil Corp., Standard Oil Co. (N. J.), Standard Oil Co. of California, and The Texas Co.—also filed answers which, though varying in tone and detail, were alike in denying the Government's allegations.

As did Socony, the other defendants attacked the Government's complaint on jurisdictional grounds, contending that the acts alleged by the Government concerned the domestic commerce of foreign countries or were carried out pursuant to foreign local laws.

Another point frequently made was that the U. S. Government was kept fully informed of the companies' actions abroad, and that in many cases it approved of and encouraged the arrangements that were made.

Output Too High

Fell tells Compact cut of 250,000 bbl. daily needed

BILLINGS, Mont.—Petroleum supply will have to be cut about 250,000 bbl. daily for the last 4 months of the year if year-end inventories are to be held to near-normal levels, according to a report to the Interstate Oil Compact Commission last week by H. B. Fell, chairman of the Supply and Demand Committee of the Independent Petroleum Association of America.

Fell estimated that the new supply required over the next 4 months would amount to about 7,850,000 bbl. daily to meet demands forecast by his com-

mittee. This is about 250,000 bbl. daily less than current supply and about the same amount under the level of supply previously forecast by the committee.

Using the latest estimates of imports furnished by importing companies to the Texas Railroad Commission, Fell predicted that imports for the period will average 1,100,000 bbl. daily compared with the current level of about 900,000 bbl. daily.

Based on an estimated required supply of 7,850,000 bbl. daily, imports of 1,100,000 bbl. daily and production at natural-gasoline and cycling plants of about 650,000 bbl. daily would mean that domestic production of crude would have to be cut to about 6,100,000 bbl. daily to hold inventories to forecast levels. This compares with an August range of between 6,500,000 and 6,600,000 bbl. daily.

Fell warned that, "If domestic production is continued through the remainder of the year at the August level and if imports are increased to the level of 1,100,000 bbl. daily, we would have inventories at the end of this year of more than 50,000,000 bbl. in excess of the level forecast by our committee."

FPC Backs Phillips

Doty tells I.O.C.C. the Federal Power Commission has no desire to carry burden of regulating natural-gas industry

Henry D. Ralph

BILLINGS, Mont.—The Federal Power Commission is strongly backing Phillips Petroleum Co. in its attempt to get the Supreme Court to reverse the lower-court finding that Phillips and other independent producers and processors of natural gas are subject to federal regulation, Commissioner Dale E. Doty told the Interstate Oil Compact Commission.

The commission is anxious to clear away the legal problems of natural-gas regulation as soon as possible in order to concentrate on administrative matters, he said, and unless the Phillips decision is reversed by the Supreme Court or Congress passes remedial legislation the problems of regulating gas producers "will be horrendous."

Doty said that to regulate more than 4,000 producers, gatherers, and processors of natural gas would require an FPC budget of $8,000,000 to control an industry which from an economic standpoint should not be controlled at all in the way suggested by the lower court.

New FPC approach . . . Doty revealed a new program on the part of FPC to work out legal and administrative problems with the natural-gas industry.

Beginning September 16, he said, the commission will hold a series of informal conferences with various committees of the American Gas Association and the Independent Natural Gas Association of America with a view to simplifying procedures and reducing the friction which has resulted from FPC policies.

Doty's remarks were made to the legal committee of the I.O.C.C. following two lengthy reports severely criticizing earlier attempts of the Federal Power Commission to regulate gas production and particularly the recent Circuit Court decision holding Phillips Petroleum Co. to be subject to jurisdiction on the same basis as an interstate pipe line.

Rayburn L. Foster, vice president and general counsel of Phillips, discussed legal points of the controversy and contended that the decision is directly contrary to the intent of Congress in enacting the Natural Gas Act. He expressed high hopes that the Supreme Court will reverse the decision, and cited many other court decisions in support of his view.

Chaos possible . . . The gas producing and processing industry will be thrown into chaos if utility regulation is imposed upon it, it was asserted by Hayden W. Head, oil and gas attorney of Austin, Tex.

Many processing plants would be abandoned, gas would be flared, and conservation set back, he said, and producers would have no incentive to explore for or produce natural gas. Among other detrimental effects of FPC regulation, Head listed these:

. . . The sales price of gas would be limited to 5½ to 6½ per cent return on investment in actual producing properties, with no allowance for previous unsuccessful exploration expenses and no allowance for dry holes.

. . . Detailed financial and operating reports would have to be filed with the FPC by every producer or operator of a natural-gasoline plant.

. . . Producers and processors could not expand or abandon any of their facilities without approval of the FPC.

. . . Producers will resist efforts of state conservation bodies to induce them to erect field processing plants because of the FPC treatment of costs of liquid products in determining gas prices.

. . . The denial of competitive prices for gas will impair conservation efforts and lead to premature abandonment of many properties.

. . . Conservation of oil produced with gas will be hampered because the present method of utility regulation may well exclude profit on oil in computing the permitted return on sale of gas.

Plant Producing Alkylate

WHITING, Ind.—Standard Oil Co. (Ind.) has begun producing detergent alkylate, principal raw material for synthetic household detergents, at a recently completed plant at its 200,000-bbl. refinery here.

Feed for the new plant is benzene and propylene tetramer. The benzene is made synthetically from crude oil at the Whiting refinery, while the propylene tetramer is produced catalytically from refinery gas at El Dorado, Ark., by Pan-Am Southern Corp., a Standard subsidiary. The two raw materials are reacted catalytically at the new plant to produce detergent alkylate.

The alkylate will be sold to synthetic detergent manufacturers through Indoil Chemical Co., another Standard subsidiary.

MEETINGS

Geologists to Meet

Regional confab features presentation of 14 papers

WICHITA.—The Mid-Continent regional meeting of the American Association of Petroleum Geologists will be held here September 30 to October 2. Registration will be in the Broadview Hotel, and technical meetings will begin October 1.

Speakers at the general session will include Bill Iverson, president of the Kansas Geological Society; John Emery Adams, president of the A.A.P.G.; and D. A. McGee, executive vice president, Kerr-McGee Oil Industries, Inc.

Program . . . According to the tentative program the following technical papers will be presented:

"General Paper on Environment of Carbonate Deposition," William H. Twenhofel, retired, Orlando, Fla., and Henry Nelson, research geologist, Magnolia Petroleum Co., Dallas; "Carbonate Reservoir," Frank Con-

selman, consultant, Abilene, Tex.; "Geologic Aspects of Surface Pennsylvanian Limestone Masses in North Central Texas," Dan Feray, Magnolia Petroleum Co., Dallas; "Correlation of the Insoluble Residue Zones of the Upper Arbuckle of Missouri and Southern Kansas," Earl McCracken, geologist, Missouri Geological Survey, Rolla; "Novinger Field, Meade County, Kansas," Charles A. Renfroe, Columbian Carbon Co., Amarillo, Tex.

"Report on New East-West Cross Section Prepared by Panhandle Geological Society," Graydon L. Meholin, Sinclair Oil & Gas Co., Amarillo, Tex.; "Geology of L. P. Gas Storage in Washed-Out Salt Cavities in Kansas," Donald F. Moore, Stanolind Oil & Gas Co., Oklahoma City; "A Companion Paper to Above L. P. Gas Storage," engineering staff, Stanolind Oil & Gas Co.; "Use of Areal Photographs for Geological Exploration and Detail Mapping in Regions of Low Dip," Frank Melton, University of Oklahoma, Norman; "A Review of Petroleum Possibilities in the Central Nebraska Basin Area," E. C. Reed, associate state geologist of Nebraska.

"A Review of Hydraulic Fracturing and Its Effect on Exploration," George Roberts, Jr., Stanolind Oil & Gas Co., Tulsa; "Artificial Formation Fracturing in Southern Oklahoma," P. E. Fitzgerald, Dowell Incorporated, Tulsa; "Hydraulic Fracturing in the Hugoton Gas Area," C. W. Matthews, Western Co., Midland, Tex.; "Artificial Fracturing of Cherokee Sands in the Gibson Pool, Cowley County, Kansas," B. K. Crumply, The Texas Co., Wichita.

Fuels Conference Scheduled

CHICAGO. — The American Institute of Mining and Metallurgical Engineers and the American Society of Mechanical Engineers will hold their annual joint fuels conference here at the Conrad Hilton Hotel October 29 and 30.

Papers to be presented that will be of interest to the petroleum industry include "Natural Gas Supply for Chicago and the Midwest," by K. B. Nagler, vice president of Peoples Gas Light & Coke Co., and "Research in Fuels for Internal Combustion Engines," by R. E. Wilson, chairman of Standard Oil Co. (Ind.)

Industry Briefs

LOS ANGELES.—Seaboard Oil Co. has acquired a 7,500-ft. strip of land south of the old production area of Huntington Beach field near here and is preparing to drill a test in the area. The well is scheduled to be drilled vertically with results possibly determining whether or not Seaboard will drill slanting wells beneath the ocean floor.

BATON ROUGE.—More than one-fourth of the revenue collected by the Louisiana state land office during August came from rentals, bonuses, and production funds from offshore oil wells. Of the $1,914,761, nearly all of which is derived from mineral leases, $538,515 was collected from offshore operations.

TOLEDO.—A new $3,000,000 alkylation plant has been put into operation here by Standard Oil Co. (Ohio). The new plant has a capacity of 2,100 bbl. of alkylate per day.

MIDLAND, Mich.—Dow Chemical Co. plans to spend about $75,000,000 on expansion of its facilities during the 1953-54 fiscal year. The proposed outlay compares with $94,000,000 spent in the fiscal year ending May 31. Leland L. Doan, president, told the company's annual meeting of stockholders that the company has spent more than $500,000,000 in new plant and equipment during the past 7 years.

AUSTIN. — Permission to unitize four leases totaling 81 acres in Big Sandy field of Stephens County, Texas, has been asked of the Texas Railroad Commission by Wittmer, Knight & Ewing, Breckenridge independent producing company. The firm plans to inject 417,000 M.c.f. of gas at a rate of 2,000 M.c.f. a day to increase pressure from 369 psi. at present to 1,000 psi. The company estimates that project would double the area's expected primary production, which to date has been 193,781 bbl.

EAST CHICAGO, Ind. — Sinclair Refining Co. is now preparing plans and specifications for a new 20,000-bbl. per day gasoline fractionating unit for its refinery here. Contracts will be let this fall, and completion of the $1,300,000 project is expected early in 1954.

BILLINGS, Mont.—Construction is expected to start here this fall on a four-story office building for Socony-Vacuum Oil Co., Inc. The building will serve as headquarters for the company's production and exploration activities in the Williston basin, the northern part of the Rocky Mountain states, and western Canada. Pegasus divisional headquarters will probably be moved from Rocky Mountain College here to the new building early next year.

TULSA.—Sunray Oil Corp. is forming a unitization division in its reservoir-engineering department to plan and promote secondary-recovery projects. A company announcement said Sunray is now taking preliminary steps toward unitization of South Sarepta field in northwestern Louisiana, Midway field in Arkansas, and other fields in Texas and elsewhere.

WILLISTON, N. D.—North Dakota will officially commemorate its birth as an oil state October 25 when a permanent monument at the site of the state's discovery well is dedicated on the Clarence Iverson farm. The monument will be erected at the site of Amerada Petroleum Corp.'s Williston basin discovery where oil was brought to the surface April 4, 1951.

The Texas Railroad Commission has approved a unitization agreement covering 880 acres of East Holliday field in Archer County. Fain & McGaha asked for approval of a water-injection plan of the Parkey sand for secondary recovery.

MID-CONTINENT

Gas Area Wildcat Finds Oil

TULSA.—The first oil discovery in Oklahoma Panhandle's Texas County was being completed late last week by United Producing Co.

The pool opener, a rank wildcat in an area known only for its gas, swabbed a net 84 bbl. of oil in 24 hours from perforations between 4,411-26 ft. in the Morrow. The well is the 1 Florence T. Kelly, C SE NE 2-4n-10eCM. The well was acidized and then fractured. At last reports it was swabbing 48 bbl. a day.

Texas County heretofore has been strictly a gas-producing area. The vast Hugoton field of the Hugoton embayment covers most of the county. The new discovery lies 8 miles west of nearest Hugoton production and 4 miles east of Cimarron County's new Keyes sand (lower Morrow) gas field.

Storage Expansion Approved

ADA, Okla.—The Oklahoma Corporation Commission has granted Southwest Natural Gas Co. authority to exercise right of eminent domain to acquire subsurface rights underlying 200 acres of land in Pontotoc County for expansion of its North Ada natural-gas storage project.

Present enlargement covers utilization of the Upper Cromwell sand of Pennsylvanian age. Originally the project was started in 1930 on an experimental basis, and in 1944 it was enlarged. Southwest Natural now has an estimated 6 billion cubic feet of gas in storage.

CANADA

Gas-Import Debate

Alberta, others disagree on effect on eastern line

EDMONTON, Alta.—At least on the surface, the Alberta government does not seem too perturbed about the authority granted by the U. S. Federal Power Commission for Tennessee Gas Transmission Co. to export natural gas from the United States to eastern Canadian markets. *(See page 65.)*

The commission order authorized the Houston firm to sell 22,155,500,000 cu. ft. of gas annually or about 60,700,000 cu. ft. daily to Niagara Gas Transmission, Ltd., Toronto, at the U. S.-Canadian border near Niagara Falls, N. Y. The Canadian company in turn will resell the gas to Toronto and eastern Ontario customers.

Alberta's Premier Ernest C. Manning said the amount of gas involved is "too small" to be concerned about.

The Ontario market is one of those considered likely for export of Alberta gas. Manning pointed out that his government has already decided Alberta has gas in excess of its own needs and it should be exported.

Politics enter picture . . . There is a political question raging in Canada as to whether Alberta gas should be piped along an all-Canadian route. The gas industry is not notably among the flag wavers, having its eye on a more economical route, easier to build and more heavily populated, through the northern United States to eastern Canada.

The Alberta Oil and Natural Gas Conservation Board currently is conducting hearings on three applications to pipe Alberta gas eastward. The applicants are Mid-Continent Pipelines, Ltd., Trans Canada Pipe Lines, Ltd., and Western Pipelines, Ltd. Trans Canada is the only company proposing the all-Canadian route.

Observers disagree . . . Most observers believe, however, that if Tennessee Gas Transmission is permitted to serve the Toronto area, the incentive will be gone to taking Alberta gas to eastern Canada. The bulk of Ontario population and industry centers around Toronto.

There is no doubt U. S. gas could reach Toronto quicker since it would only have to be piped from Buffalo, N. Y. Also, Toronto industry is concerned about the probable cost of Alberta gas, especially if it goes over an all-Canadian route.

Lease Sale Scheduled

REGINA, Sask.—Eleven leases on 6,556 acres of Crown lands will be offered in Saskatchewan's second public sale of oil and natural-gas leases September 25.

The acreage to be leased is in the Brock and D'Arcy areas of west-central Saskatchewan. The sale will include natural-gas leases on five tracts of land in the Brock area containing 2,720 acres, oil and natural-gas leases on four other tracts containing 2,556 acres in the Brock area, and oil and natural-gas leases on two D'Arcy tracts containing 1,280 acres.

The six oil and gas leases contain a drilling committment within 90 days of the lease date and a test of the Viking sand. Successful bidders will be announced with 10 days after the bids are opened September 25.

Expansion Work to Start

SARNIA, Ont. — Construction will begin immediately on the $10 million expansion project which Imperial Oil, Ltd., announced last spring for the Montreal East refinery. Canadian Bechtel, Ltd., of Vancouver has been awarded the major part of the construction.

The refinery will be expanded from 46,000 to 58,000 bbl. per day in crude-processing capacity by the addition of a combination atmospheric and vacuum crude still. The 15,500-bbl. per day fluid catalytic cracking unit will also be expanded. Completion of the program is expected in early 1954.

The Montreal East refinery operates chiefly on Venezuelan crude, delivered by pipe line from Portland, Me. Following expansion, it will remain Canada's second largest refinery, topped only by Imperial's Sarnia plant, presently being expanded to 71,000 bbl. per day.

A.I.O.C. May Enter Canada

OTTAWA.—Anglo-Iranian Oil Co., Ltd., may extend its operations to Alberta, Canada. A final decision is expected to be reached soon after the directors of the company receive the report of John Mellor Pattinson, a managing director who has been in Canada since early in August.

Pattinson has said that the company's proposed operations would be limited largely to production and, at least in the beginning, would be relatively small with gradual expansion later. Construction of a refinery in North America by the British-owned company is only a future possibility, he said. An Anglo-Iranian subsidiary, D'Arcy Exploration Co., has had an engineer and a geologist working out of Calgary for the past year.

135-Mile Loop Near Finish

REGINA, Sask.—Construction of a 24-in. loop on Interprovincial Pipe Line Co.'s main line from Regina to Gretna, Man., is nearing completion.

The 135-mile loop will provide additional capacity for the main line to meet demands of the company's extension from Superior, Wis., to Sarnia, Ont. Located just 10 ft. from the main line, the loop will cost an estimated $9,000,000.

Once A Texan . . .

This Texas Highway Department sign advertising a roadside park appears, not in Texas, but in California, in Castaic Junction field near Newhall. Explanation of the phenomenon might lie in the fact that Castaic Junction is owned entirely by Humble Oil & Refining Co., the nation's biggest crude-oil producer and until recently strictly a Texas company. Since moving into California, Humble has completed 14 producers in this three-zone field between 9,500 and 12,500 ft. and has a current production of about 2,500 bbl. daily.

Gulf Leases Sold

Stanolind pays $329,300 for leases on four 640-acre tracts in the first sale of Texas tidelands in 6 years

HOUSTON.—Stanolind Oil & Gas Co., successful bidder on all of the four Gulf of Mexico tracts offered at the first "Tidelands" lease sale held by Texas in nearly 6 years, has no definite plans at present to drill in the area.

The sealed-bid sale was held in Austin September 1. Stanolind received leases on four 640-acre tracts, Nos. 85, 94, 95, and 96, about 3 miles offshore from Jefferson County.

A total of 235 tracts was offered during the sale, covering 103,460 acres, including the four offshore tracts. Total paid by companies was $3,423,470, and Stanolind's bids for the offshore tracts amounted to $329,300.

"Our plans are fluid," an official of Stanolind in Houston told The Oil and Gas Journal.

He said Stanolind plans to continue building up its acreage holdings in order that work can be resumed when final governing policies for producing offshore are determined.

It has been reported here that Stanolind was planning to construct a big drilling platform for offshore work, but the company would not confirm it. Stanolind has been reported increasing its seismograph-party crew strength in areas adjacent to the offshore regions, particularly in the Louisiana Delta region.

Considered valuable . . . In Austin, Land Commission Chairman Bascom Giles said that the offshore bids September 1 were "very gratifying." They refuted, he said, any claims that such lands are not considered valuable oil-producing structures by the oil companies.

The sale was the first held involving Gulf of Mexico leases since the long-drawn-out battle over ownership of the Tidelands between the states and the Government.

Federal ownership of the offshore areas (from shoreline out to the 3-league limit) was sustained by the United States Supreme Court in December 1950. Former President Truman vetoed two congressional bills calling for quitclaiming the potentialy oil-rich submerged lands to the states. Congress passed an additional bill this year and President Eisenhower, who during his campaign promised he would not veto it, kept his word.

Signing of the bill by Eisenhower did not signal the immediate resumption of Continental Shelf drilling activities, however. There is still the matter of detailed Government regulations to govern production in areas outside the 3-league limit. (The four Stanolind leases, however, are within the 3-league limit.)

The Interior Department announced recently that procedures to be followed by Continental Shelf operators to insure federal validation of existing state leases "will be announced soon."

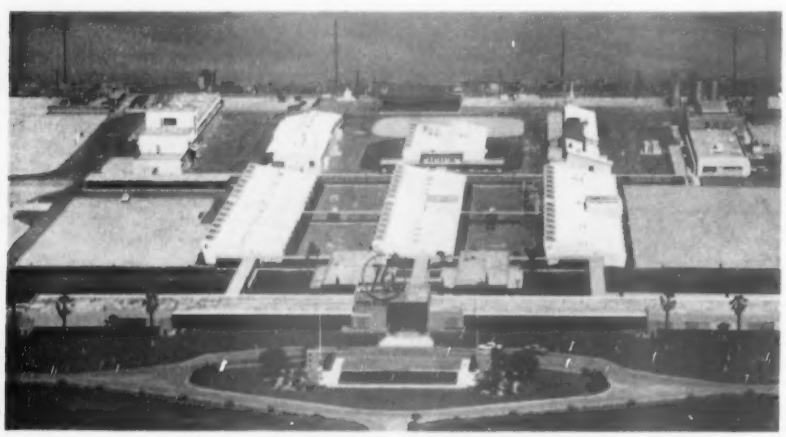
Under the law providing for federal control of the Shelf beyond state boundaries, operators holding leases issued by the states before Texas and Louisiana decisions may continue holding them as federal leases if they meet the requirements set forth in the act.

Transfers must be made within 90 days after the President signs the law. This puts the deadline early in November.

The Interior Department is planning to return to the states about $5,000,000 paid by operators on leases within state boundaries, and held in escrow pending settlement of the issue.

Shivers cites problems . . . Gov. Allan Shivers of Texas previously stated in a newspaper article that there were four major problems which will have to be solved before actual drilling can get under way again off the Texas Coast. They are determination of the 1845 coast line of Texas from which the 3-league limit of state authority will be measured; determination of the boundary between Texas and Louisiana, which is in dispute; validity of Tidelands leases made prior to government intervention; and the question of adequate conservation and proration policies outside the 3-league limit.

Next sale pending . . . In Austin, Land Commissioner Giles' office told the Journal that the next state lease sale, involving offshore tracts in the Gulf of Mexico, "probably will be held sometime in December."



Research is Keynote at Union Oil's Brea Center

The accent is on research for the more than 300 Union Oil Co. employes who occupy the $8,000,000 research center at Brea, Calif., shown above in an aerial photograph. One of the most modern in the industry and less than 2 years old, the center occupies a 100-acre site 30 miles southeast of Los Angeles. Basically one-story in architecture, the plant is functional in design with buildings arranged for north lighting in all laboratories. The center was established to centralize activities of Union Oil's research, process and patent divisions.

Suntide on Stream

All units of new refinery due finish by December 5

CORPUS CHRISTI.—The crude and vacuum units of Suntide Refining Co.'s $16,000,000 catalytic cracking refinery went on stream last week, and four other units of the refinery are due for completion by December 5.

Floyd L. Martin, Suntide president, fired the refinery boilers in a formal test run after Lummus Co. completed construction of the first two refinery units 5 days before the September 1 completion date. The refinery, located on Nueces Bay in the heart of the

Texas Gulf Coast oil-producing region, will receive the major part of its crude from Sunray Oil Corp., owner of 50 per cent of Suntide's stock.

Sunray is committed to supply the new refinery with 20,000 bbl. of crude daily for the next 10 years. The refinery, when completed, will have a 35,000-bbl. capacity and is so designed that additional units can be added to double that capacity.

The crude unit now in operation is building up a storage supply of gas oil pending the completion of the cat cracker, expected to be finished sometime between November 1 and 10. Officials say the gas concentration unit will be completed by November 15, the polymerization unit by November 25, and the alkylation unit by December 5.

The refinery will be managed by Herman Gunter, vice president and manager, and T. C. Bodley will be Suntide's vice president in charge of sales and crude purchases.

Houston Fights Smog

Civic committees seeking air-pollution relief plan

HOUSTON.—Nine straight days of rain and a heavy smog blanket over most of Harris County's huge industrial area have intensified Houston's civic efforts to reach a "practical plan" for air-pollution control.

J. B. Dannenbaum, Houston civil engineer who heads the Community Council's air-pollution committee, last week named four subcommittee chairmen to help develop a three-phase program to relieve conditions.

"Through cooperation of government agencies and interested citizens of Houston and Harris County we hope to find a way to control existing air pollution, prevent additional pollution, and support necessary law enforcement to aid a Harris County air clean-up campaign," Dannenbaum said.

Dannenbaum said the first step will be meeting privately with representatives of each industry to discuss possible solutions to the problem and secure their cooperation "in adopting the best method of control."

Suits threatened . . . Harris County officials contend that smog conditions are getting worse instead of better and most Houston residents agree with them. Chemical and other industrial plants along the Houston Ship Channel have received the blame for creating the oppressive atmosphere with their acrid smoke and fumes.

Harris County officials have already threatened suits for injunctions against these operators and have conferred with the state attorney general and Texas Department of Health in Austin about the problem. In a report published last year by the Community Council, the establishment of a committee to correlate the efforts of industry, government and public was recommended.

The subcommittee chairmen named by Dannenbaum were: O. R. Stewman, E. F. Drew Co., for a study of control and prevention of air pollution; Dr. L. D. Farragut, health officer, enforcement committee; Dr. Charles F. Hiller, University of Houston, research committee; and Wendel Ley, Houston realtor, public-relations committee.

ROCKY MOUNTAIN

Montana Outlook Good

I.O.C.C. is told prospects for entire Williston basin are good with discovery of additional fields expected

BILLINGS, Mont. — Oil discoveries in the Williston basin during the past 2 years have caused a tremendous upsurge in all phases of oil-industry and general economic activity in Montana. They promise to make the state a major oil producer within a few years, Gov. J. Hugo Aronson declared in welcoming the Interstate Oil Compact Commission to his state for its summer meeting last week.

To prepare for this, he explained, Montana has enacted modern conservation and regulatory laws and is now in the process of setting up a new oil and gas commission.

The Williston basin was the theme of a major portion of the program of the I.O.C.C. meeting, and both the general session and several committee meetings were devoted to various aspects of this area.

A comprehensive report on development and production in the Williston basin was presented by C. V. Millikan, chief engineer of Amerada Petroleum Corp., Tulsa. Wilson M. Laird, North Dakota state geologist, described the geology of the basin in detail, and Dois D. Dallas, petroleum engineer of the North Dakota Geological Survey, described the new regulations and conservation procedures of the state.

Basin potential . . . "The Williston basin now has a niche in the oil industry," Millikan declared. "With so large an area, with so thick a sedimentary section, with so many potential oil and gas reservoirs, with so many seismic parties and geologists looking for oil, and with so many square miles now under term lease, it is certain that drilling will continue very active.

"Probabilities alone make it unlikely that all or even a major portion of all the oil fields in the area have been found. . . The Williston basin will see much more of oil men and oil."

Since the discovery of Beaver Lodge and Tioga fields in 1951, Millikan said, there have been four more discoveries on the Nesson anticline, one farther to the south, and three to the northeast. Montana now has 11 fields in the Williston basin, and 9 fields have been discovered in the Canadian portion of the basin, he reported.

"The impact of discovery of oil in the Williston basin is most vividly indicated by exploration activity," he said. "In July 1950 there were 34 seismic crews in the basin and 35 in July 1951. The number increased to over 50 by the end of the year and to 124 in July 1952. Thereafter there was a decrease and there are now 101 crews reported in the area.

"Prior to 1951 there were only 44 wildcats drilled in the entire basin which tested pre-Pennsylvanian formations. In 1951, there were 23 wildcats completed, the first 2 of these being the discovery wells. There were 130 completed in 1952, discovering 19 fields. During the first 7 months of 1953 there were 97 wildcats completed which discovered 6 fields, and currently there are some 41 wells drilling."

Refinery Gets Tax Write Off

WASHINGTON.—Accelerated amortization of a new refinery to be constructed at Williston, N. D., by the Williston Basin Refinery Corp. was authorized last week by the Office of Defense Mobilization.

The refinery, to cost $417,895, includes a crude unit, catalytic reforming unit, utilities and auxiliaries to give a 1,500 bbl. per day throughput. The company was granted quick write off of 65 per cent of $223,735 for basic refining facilities, 45 per cent of $184,300 for auxiliaries and 15 per cent of $7,800 for buildings.

Tax Writeoffs Reviewed

Government giving mobilization program new close look; rapid tax amortization policy probably will be changed

WASHINGTON. — Expansion goals of the mobilization program are being reviewed by the Office of Defense Mobilization with a view to cutting off the privilege of accelerated tax amortization from industries which have reached their objectives.

A "rather large percentage" of the 233 expansion programs laid out since the invasion of Korea in 1950 have been completed, Defense Mobilizer Arthur Flemming said last week.

Flemming declined to specify the industries which have fulfilled their programs but said the entire situation is being reviewed both in ODM and the agencies that pass on individual applications. The Petroleum Administration for Defense handles and makes recommendations on projects of the oil and gas industry.

Under the mobilization program tax benefits have been granted on about 60 per cent of some $28,000,000,000 in new facilities, more than $3,700,000,000 of them in the oil and gas industry.

The existing goals, Flemming said, are being reviewed "to see if they bear a realistic relationship to the mobilization needs."

While considering the withdrawal of accelerated amortization from industries which no longer need that incentive to invest money in new facilities, the ODM is considering the use of the quick tax writeoff as an inducement for the building of plants in areas of unemployment.

Another proposal under study, Flemming disclosed, would earmark a percentage of government contracts for plants in distressed areas with companies in other areas barred from bidding. This would replace the former ODM policy of giving contracts to companies in areas having 6 per cent or more unemployment if they could match the lowest price bid by companies elsewhere, which has not worked it to the satisfaction of either industry or Congress.

Program analyzed . . . An analysis of the expansion programs of the oil and gas industry shows that up to July 31 of this year applications amounting to more than $4 billion had been acted upon by ODM.

A total of 1,454 certifications were issued in the amount of $3,711,065,000, not including $102,261,000 disallowed, and 278 applications aggregating $451,025,000 were denied. The average allowed for quick writeoff was 50 per cent. ODM actions in the various segments of the industry were as follows:

. . . Natural gasoline, 204 certifications totaling $304,850,000 and $83,620,000 disallowed; 44 applications totaling $7,140,000 denied; average for accelerated amortization, 57 per cent.

. . . Crude and products storage, 361 certifications totaling $159,267,000 and $13,290,000 disallowed; 40 applications totaling $9,122,000 denied; average for amortization, 40 per cent.

. . . Crude and products pipe lines, 139 certifications totaling $808,522,000 and $43,651,000 disallowed; 30 applications totaling $141,822,000 denied; average for amortization, 24 per cent.

. . . Gas transmission, 71 certifications for $496,510,000 and $5,671,000 disallowed; 5 applications totaling $1,741,000 denied; average for amortization, 26 per cent.

. . . Gas distribution, 14 certifications for $2,386,000 and $60,000 disallowed; 15 applications totaling $5,142,000 denied.

. . . Oil-field equipment, 7 certifications for $8,003,000 and $398,000 disallowed; 37 applications totaling $6,490,000 denied; average for amortization, 32 per cent.

. . . Basic refining, 374 certifications for $1,434,879,000 and $18,158,000 disallowed; 43 applications totaling $85,971,000 denied; average for amortization, 63 per cent.

. . . Alkylates, aromatics and lube-oil additives, 149 certifications for $200,538,000 and $2,744,000 disallowed; 9 applications totaling $2,029,000 denied.

. . . Sulfur, 41 certifications for $21,079,000 and $140,000 disallowed; 2 applications totaling $6,182,000 denied; average for amortization, 84 per cent.

. . . Lubricating oils, 12 certifications for $13,295,000 and $130,000 disallowed; 11 applications totaling $15,244,000 denied; average for amortization, 50 per cent.

. . . Cracking catalysts, 16 certifications for $28,803,000 and $28,000 disallowed; 2 applications totaling $137,000 denied; average for amortization, 78 per cent.

. . . Petrochemicals, 35 certifications for $157,573,000 and $7,622,000 disallowed; 32 applications totaling $89,914,000 denied; average for amortization, 62 per cent.

Tide Water Topples the Last of Its Kern River Derricks

Last of the derricks on Tide Water Associated Oil Co.'s properties in the Kern River field, near Bakersfield, was recently dropped to the ground. It was the last of the 866 wooden structures which formerly dotted the landscape. Portable pulling units will henceforth be used to service the wells. Felling the derricks was simple. Timbers which might damage the pumping unit were removed, one leg sawed out so that the derrick would fall in the right direction, and then the supporting cables were cut. The photograph shows what happened when the law of gravity took over.

Alkylate Ban Will Remain

WASHINGTON.—Present prohibitions on the use of alkylate in automotive gasoline will be kept in effect indefinitely, Petroleum Administration for Defense officials indicated last

This "TRIO" sounds new notes on pipe economy

1 Wide Range of Wall Thicknesses (¼- to ½-inch)

2 Wide Selection of Diameters (6 to 36 inches)

3 Long Lengths (up to 50 feet)

Armco Welded Steel Pipe is in close harmony with most line pipe specifications. It offers important advantages to help save money, metal and time.

With the wide range of diameters and wall thicknesses available you can match job requirements *exactly!* There is no need to compromise on capacity or strength—or purchase costly extra metal not warranted by the job.

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ARMCO

WATCHING WASHINGTON

Bertram F. Linz

'54 Session Vital to G.O.P.

The 1954 session of Congress will make or break the Eisenhower administration.

Democratic leaders, with an eye on next year's elections, have indicated they will not support the President as strongly as they did this year.

Much of next year's legislation will be on subjects over which Republicans and Democrats differ radically. There was little such legislation this year, and Democrats could go along with the President's program.

The oil industry will have a big stake in next year's legislation. Major measures will deal with a new long-term foreign trade policy, revision of the Taft-Hartley Act, a new foreign policy, a long-range tax program, a balanced budget, expansion of social security and increased postal rates. All of these are matters of inter-party controversy.

Failing to put through a program which appeals to the people the Republicans could readily lose their majorities in Congress. To put it through, the Republican leadership will have to enforce a much stronger discipline upon its followers than it was able to this year.

Government Plant Threat?

The threat of government-owned plants has been raised over the heads of refiners reluctant to install alkylate facilties.

If efforts to induce the voluntary construction of facilities fail, Petroleum Administration for Defense officials are telling refiners, it will be necessary to "request" installation of government-owned plants at strategic locations.

The warning is going out to refiners whom PAD believes have feedstocks available for making alkylate. Officials believe there are enough feedstocks to carry out the 20,000-bbl. increase in daily alkylate capacity at which the government is aiming.

The new drive was initiated following consideration of the aviation-gasoline problem by the National Security Council and President Eisenhower.

PAD is now making a survey of present and possible new alkylate capacity and expects to come up with definite figures by November 1. It plans to develop concrete proposals for the expansion necessary to attain the goal of 30,000 bbl. daily additional capacity, only 10,000 bbl. of which has been obtained so far.

While some in the industry read into PAD's letters a threat of government construction of plants, most observers in Washington believe the government will go no further than to request that refiners having potential feedstocks permit installation at their plants of alkylate units to be financed by the Government.

New Policy May Affect Oil

An electric-power policy has been laid down by the administration which may have some effect on government activities in the field of oil and natural gas.

The new power policy is aimed at minimizing the Government's activities and placing the responsibilities for development on the states and private industries. The Government's part in the future power program will be limited largely to such development as may be necessary in the interests of national defense, and to projects of a magnitude or complexity beyond the means of local, public or private enterprise.

If this new view of the function of the Government in resources development is extended to all areas it may be reflected in its oil and gas activities. This has already been indicated by the dropping of the Navy's search for oil in Alaska and the closing of the Bureau of Mines' synthetic liquid fuels demonstration plant in Missouri.

President Eisenhower himself has indicated that the power policy is not one to be confined to a single problem.

"This policy," he said is in accord with the principle that the states and local communities, private citizens and the federal Government itself should cooperate in an effort actively to encourage the development of the natural resources of the country.

"It is my hope and my considered belief that, translated into action, this policy will serve the best interests of all the people of the United States."

week in revoking PAD Order No. 4.

Lifting of the order requiring the increased use of tetraethyl lead, rather than alkylate, in commercial aviation gasoline means only that avgas is in adequate supply for current needs but not that it is abundant, it was explained.

The prohibition on the use of alkylate in automotive gasoline, the controls on the use of aviation-gasoline components, and exports of avgas were factors which made the lifting of the TEL requirement possible, Deputy Administrator Joseph A. LaFortune said.

"All of our calculations on avgas supply have been based on the assumption that removal of Order 4 would simply permit a return to the TEL-content levels in effect before the order was imposed," he said. "If any attempt is made to use even less TEL, some new regulation may have to be put into effect."

Europe to Pay Less

Dip in Middle East prices shaves estimate of outlay

WASHINGTON.—Middle East crude oil isn't going to cost European importing countries as much as was thought in July, when companies in the Middle East followed the 25-cent-a-barrel price boost posted for crude in the United States.

In a report to the House Interstate Commerce Committee last week, Cornelius J. Dwyer, chief of the Foreign Operations Administration petroleum branch, said that present Middle East prices indicate that European countries will pay $15,000,000 more a year for their dollar crude than they did before the price hike, instead of the $25,000,000 originally estimated.

In July, Dwyer estimated that American company exports of Middle East crude to Europe, excluding in-bond refining, would average 468,000 bbl. a day. Of this, he said, 272,000 bbl. would be sold for dollars, 147,000 bbl. would be sold to the United Kingdom for sterling, and 49,000 bbl. would go to other countries for soft currencies, including sterling.

It now appears, Dwyer said, that the 49,000 bbl. going to soft-currency countries might be handled without the use of dollars, which he said in July might be required as a result of the price increase.

Price now settled . . . Harold E. Stassen, director of foreign operations, told the committee that price increases for Middle East crude have now settled down

Celanese creates new horizons for industrial chemistry

The rapid rise of Celanese Corporation of America from an obscure beginning to its current unique position, typifies the success saga of American business. In more than a casual sense, the Celanese story is that of the world's chemical plastics and textile industries. As a result of its infinite drive for perfection, the American people of every economic level are better dressed than any other nation of the world.

Celanese Corporation's integration program embraces affiliates in Europe, the Orient, Latin America, and extensive expansion of already vast operations in Canada and the United States.

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to a level averaging 17½ cents a barrel higher than before.

In his report, Dwyer explained that "after a period of confusion" posted prices for 36° A.P.I. gravity crude have apparently settled down to an increase of 10 cents at the Eastern Mediterranean pipe-line terminals, 17 cents at Fao, Iraq, at the head of the Persian Gulf, 22 cents at Kuwait and Ras Tanura, and 25 cents for the small quantities of high-quality crude shipped from the Sheikdom of Qatar.

Dwyer explained that the Fao price (set by Socony-Vacuum) apparently allows a 5-cent freight differential in favor of Ras Tanura, while the Kuwait price probably comprises a similar differential, plus a quality discount due to the low gravity and high sulfur content of the crude, and the 3-cent premium for Qatar undoubtedly takes into account the high quality of the oil.

Crude-Import Peak

Shipments in June reached record 719,000 bbl. daily

CRUDE imports reached an all-time high in June, but the normal seasonal decrease in receipts of residual fuel held total imports to a level about 154,000 bbl. daily less than the record established last December.

IMPORTS INTO CONTINENTAL UNITED STATES
(Thousands of barrels)

	June 1953	May 1953	June 1952
Crude—			
Mexico	593	456	485
Colombia	1,260	1,460	1,334
Venezuela	9,408	10,588	10,040
Kuwait	4,147	2,586	2,680
Saudi Arabia	4,219	3,646	2,335
Qatar	114	385	
Canada	224	204	2
Far East	1,594	1,404	451
Total crude	21,559	20,729	17,327
Daily average	719	669	577
Products—			
Residual fuel	9,543	11,394	8,929
Other products	633	617	1,024
Total products	10,176	12,011	9,953
Daily average	339	387	332
Total all oils	31,735	32,738	27,280
Daily average	1,058	1,056	909

EXPORTS*

	June 1953	May 1953	June 1952
Crude	1,824	1,611	2,388
Gasoline	2,004	2,179	1,912
Kerosine	904	500	739
Distillate fuel	2,711	2,525	3,596
Residual fuel	1,645	1,591	2,587
Lube oils	1,038	1,012	1,306
Other products	918	805	929
Total all oils	11,044	10,223	13,457
Daily average	368	330	449

*Excludes shipments to territories.

Total imports in June averaged 1,058,000 bbl. daily, including 719,000 bbl. daily of crude and 339,000 bbl. daily of petroleum products, according to data released by the Census Bureau of the Department of Commerce.

Daily average receipts of foreign crude in June represented an increase of 50,000 bbl. daily over the previous record set in May and a gain of 142,000 bbl. daily over the average for June 1952. Crude imports, reported by the Department of Commerce, averaged 624,000 bbl. daily for the past 12 months compared with the 719,000 bbl. daily in June.

Big Venezuelan share . . . Crude from the Middle East represented 39.3 per cent of total crude imports in June. Venezuelan crude accounted for 43.6 per cent of the total. However, Venezuela's portion of total petroleum imports was much larger since almost all of the imported residual fuel, amounting to 318,000 bbl. daily, either came from Venezuela or was made from Venezuelan crude at one of the Caribbean refineries.

Crude imported by refiners on the West Coast has accounted for much of the increase for the past few months. West Coast imports of crude in June averaged 118,600 bbl. daily to establish a new record for the district.

Total exports of crude and products, excluding shipments to territories, averaged 368,000 bbl. daily in June for an increase of 38,000 bbl. daily over May but a drop of 81,000 bbl. daily from June last year. Compared with last year, the most important decreases were in shipments of distillate and residual fuels.

Advance Pay Not Deductible

WASHINGTON. — Advance payments on intangible drilling and development costs, by operators treating such costs as expenses, are deductible only for the taxable year in which the drilling and developing services are actually rendered, it was held by the Internal Revenue Bureau last week.

The bureau's ruling was made in a case where an operator made a formal agreement with a drilling contractor in December 1951, and made an advance payment on the work December 31. The drilling did not actually start until the following month, and the bureau refused to allow the prepayment as a deduction in the operator's income return for 1951.

The bureau held that the advance payment constituted compensation for services and rental for the equipment that the contractor employed in performing the services, and as such was deductible only in the year in which the services were actually rendered.

Plant Sales Set

Government seeks bids on two demonstration plants

WASHINGTON.—Disposition of the two synthetic liquid fuels demonstration plants at Louisiana, Mo., formerly operated by the Bureau of Mines, will get under way within the next week or 10 days.

Invitations to bid for the purchase or lease of the plants, representing an investment of $15,000,000 of government money, together with an anhydrous ammonia plant which cost $16,000,000, will be sent out this month from the Omaha office of the Army Corps of Engineers. The bids will be opened some time in November.

Disposition of the facilities, comprising the Missouri Ordnance Works, was ordered by Congress after Interior Secretary Douglas McKay directed that the synthetic fuels plants be shut down. The facilities are now being put into semipermanent standby status, but will be left in shape for quick return to use.

One of the fuels plants was built to demonstrate the production of oil, gasoline, and chemicals by the hydrogenation process. The other operated on the gas-synthesis process.

Terms of contracts . . . Offers to buy or lease the plants will be considered on several bases. One calls for purchase of the ammonia plant and the property on which it and the fuels plants are located, with an agreement to maintain the latter until the Government disposes of them. Another for purchase of all three plants and still another calls for purchase of the fuels plants for removal to another site.

Bidders interested in operating but not owning the plants may offer to lease them as a whole, or to leave the ammonia plant, with agreement to maintain the fuels plants pending their disposition.

Products Shipments Gain

WASHINGTON.—Shipments of petroleum products by processors last year amounted in value to more than $10,844,000,000, according to estimates just compiled by the Census Bureau.

The 1952 output was approximately $359,000,000 above that of 1951 and represented a gain of nearly two-thirds over the $6,746,000,000 of products shipped in 1947.

Slightly more than half the total trade was in gasoline, shipments of which were reported as $5,744,222,000

last year against $5,418,974,000 in 1951 and $3,136,709,000 in 1947. The next most important product was distillate fuel oil, $1,921,590,000 against $1,750,134,000 in 1951 and $918,291,000 in 1947. Shipments of kerosine, asphalt, and unfinished oils also increased in value.

Fuel Official Quits

Government plant's closing spurs expert's resignation

WASHINGTON. — Closing of the government's liquid synthetic fuels demonstration plant at Louisiana, Mo., led indirectly last week to the resignation of Dr. W. C. Schroeder as assistant director of the Bureau of Mines.

Schroeder, who spearheaded the efforts of the bureau during the Truman administration to develop a synthetic liquid fuels industry, will become a professor of chemical engineering at the University of Maryland and also will engage in consulting work for a number of natural gas and chemical firms.

He said the closing of the demonstration plant had no direct bearing on his decision to leave the bureau but admitted that, while he has long contemplated leaving the government the contraction of the synthetics effort influenced him to act.

A decision to shut down the Louisiana facilities was announced last April by Interior Secretary Douglas McKay on the ground it had served its purpose in studies of production of gasoline from coal by hydrogenation and gas synthesis. Schoeder did not agree with that decision.

Petrochemicals Drop

1952 output 8.6 per cent under 1951, study shows

WASHINGTON.—Crude petrochemical production totaled 7,867,000,000 lb. in 1952, a drop of 8.6 per cent from the 8,607,000,000 lb. of 1951, it was reported last week by the Tariff Commission.

The decline in output of crude products from petroleum and natural gas was in line with the drop in production of synthetic organic chemicals generally, the commission disclosed.

The Tariff Commission's annual report showed that the output of tar and tar chemicals, together with crudes from petroleum and natural gas, totaled 26,499,000,000 lb. last year compared with 30,002,000,000 lb. in 1951. The combined production of cyclic intermediates and finished synthetic organic chemicals, a figure which involves much duplication, was 26,119,000,000 lb., a decrease of 5 per cent from the 27,499,000,000 lb. of 1951.

The combined production of coal tar, water-gas tar and oil-gas tar last year amounted to 793,000,000 gal. compared with 932,000,000 gal. in 1951. Production of the principal tar crudes — including identical products derived from petroleum—declined in 1952 except for the production of toluene. The output of benzene was 252,000,000 gal., some of which was distilled from imported raw materials, compared with 266,000,000 gal. in 1951. The output of toluene increased to 105,000,000 gal. from 101,000,000 gal, but production of xylene dropped to 72,000,000 gal. from 76,000,000 gal. and crude naphthalene at 322,000,000 lb. was 9.3 per cent under 1951.

Resources Conference Planned

WASHINGTON.—John R. Suman, vice president of Standard Oil Co. (N. J.) and representative of the American Petroleum Institute, has been named a member of a steering committee to plan the Mid-Century Conference on Resources for the Future to be held here December 2-4.

The conference will be sponsored by Resources for the Future, Inc., a nonprofit corporation.

Topics to be discussed at the conference will include energy resources problems, world supply and availability of natural resources, problems in resources research, and patterns of cooperation.

SOUTHEASTERN

New Oil Basin

Black Warrior discovery sets off wave of leasing

ABERDEEN, Miss.—First oil production in the Black Warrior basin of northeastern Mississippi and northwestern Alabama has been opened by Magnolia Petroleum Co. with its 1-A Snow, a rank wildcat in Mississippi's Monroe County.

The well also marks the first production of any kind in the basin from pre-Mississippian rocks, or elsewhere in Mississippi or other southeastern states from formations below the somewhat younger Cretaceous.

The new discovery well, at latest report shut in pending provision of additional tankage for final completion gages, flowed initially, after acidization of the producing zone, at the rate of 29.3 bbl. of 35°-gravity oil per hour through 17/32-in. choke. Later, with flow further restricted to a 12/64-in. choke, it produced at the rate of 216 bbl. of oil per day, gaging 300-psi. pressure on the tubing.

Knox formation . . . Productive formation is the Knox dolomite of lower Ordovician-upper Cambrian age, opposite which casing is perforated at 4,753-56 ft. Top of the porosity zone had been indicated in cutting samples to be 4,751 ft. Bottom of the hole is at 4,769 ft.

Knox dolomite is the approximate equivalent of the prolific Ellenburger horizon of West Texas and the Arbuckle of Oklahoma and Kansas. Although known to be present over an extensive area of northern Mississippi and Alabama, Tennessee, southern Kentucky, the western Carolinas, and northwestern Georgia, it has been little prospected by the drill. Some small production, at shallow depths, has been found in it in North Central Tennessee and southern and eastern Kentucky. The Magnolia discovery is the first indicated sizable production in it.

Rank wildcat . . . Location of the well is in the C NW NE 27-13s-7e, approximately 7 miles north of Aberdeen and about the same distance southwest of Amory. It is about 18 miles southwest of the long-abandoned Amory gas field, Mississippi's first production of any kind, discovered in 1926, and which produced from the Hartselle sandstone of upper Mississippian age

It is more than 100 miles northeast of the nearest oil production, located in the Pickins field, Yazoo and Madison counties, northernmost of southern Mississippi's fields, which produces from the Eutaw sand of upper Cretaceous age.

Gas discoveries . . . The discovery already has initiated a new wave of leasing throughout the Black Warrior basin, scene of an extensive exploratory play the past year and a half in exploitation of upper Mississippian potentialities.

The latter play has resulted in the discovery of five gas or gas-condensate fields, two in Monroe County, location of the Magnolia well, and the others in Chickasaw and Clay counties, adjacent to the west and south. Nearest to the Magnolia discovery is Aberdeen field, 7 miles to the southwest.

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Foreign Drilling Up

Intensified exploration programs over most of the world increase number of rotary rigs in operation to new high

Dahl M. Duff

ROTARY rigs in operation outside the United States have increased slightly over the last year and now total approximately 634 in all non-Communist foreign areas.

The accompanying tabulation based on best available information shows distribution of these drilling outfits by major geographical areas. The figures are estimated in those cases where precise and up-to-date information was not obtainable. The data are designed to exclude geophysical and core-drilling equipment but these may be included in a few isolated cases along with workover rigs.

The figures indicate that all areas of the Eastern Hemisphere increased the number of rigs in operation during the last 12 months. On the other hand, the total for South America is down slightly, due mainly to decreases in Venezuela and Peru.

The large number of rigs running in Europe reflects the intensive effort currently being made to develop further supplies of oil and natural gas in this important consuming region. The large number of rigs operating in West Germany is due to the encouragement given exploration by the post-war discoveries and also to the fact that the nature of some of the German fields requires intensive exploratory drilling.

France is carrying out a large-scale, state-supported exploratory program which also provides for work in its African territories. Drilling in Italy arises principally out of exploration and development of natural gas by the government company, but an increasing amount of exploratory drilling is expected in Sicily where several foreign operators have concessions.

Exploratory interest in Africa has picked up considerably over the last few years. On both the east and west coasts of the continent a number of programs by foreign operators are either in the drilling stage or still confined to preliminary geological and geophysical investigations.

Drilling in the Middle East is mainly in the development of existing fields, including Ghawar in Saudi Arabia, Magwa in Kuwait, and Zubair and Ain Zalah in Iraq. Some exploratory drilling is being carried out in Iraq, on the Trucial Coast, and in Turkey. The changes in the number of rigs over the last year have been slight. The 38 rigs now running support a production in excess of 2,500,000 bbl. daily.

Number to increase . . . The number of rigs in operation outside the United States will probably go considerably higher during the next year or two, barring a severe slump in the industry. A large number of exploratory programs in both hemispheres are now in their initial stages, and as this work advances, more widespread drilling will be required.

Exploratory drilling is getting under way in new concessions in the coastal region in Peru, while other long-range undertakings are shaping up east of the Andes. Favorable legislation is giving impetus to operations in Colombia. In Venezuela, there is renewed talk of the possibility of awarding new concessions, and the chances of action seem good.

Other exploration is in prospect in a number of countries of the Eastern Hemisphere. Several companies are showing an interest in Turkey, where the government is preparing to submit a new oil law to the parliament. Operations are getting under way in Israel which opened up last year. Exploratory work is being pushed in the Sahara Desert in southern Algeria, American companies are studying Somalia and British Somaliland, and a new oil law is under consideration in Libya. British companies are doing preliminary work along the east coast of Africa.

These and other programs are a part of the "new look" being taken at many wildcat prospects in Africa and the Mediterranean region.

Rotary Rigs in Operation Outside the United States

(Excluding Communist-controlled areas)

Country—	August 1953	July 1952	March 1948
North America:			
Alaska			2
Cuba		1	
Mexico	80	80	37
Total	80	81	39
South America:			
Argentina	45	45	50
Bolivia		2	2
Brazil	5	5	5
Chile	5	5	4
Colombia	21	17	24
Ecuador	9	11	11
Paraguay			2
Peru	18	22	21
Trinidad	27	27	22
Venezuela	117	122	133
East. and Cent.	69	60	67
Western	48	62	66
Total	247	256	274
Europe:			
Denmark	3	3	1
British Isles	6	8	9
France	26	31	22
West Germany	105	95	70
Italy	26	20	15
Netherlands	5	4	4
Portugal	2	2	
Spain	3	3	3
Total	176	166	124
Africa:			
Algeria	6	5	2
Egypt	1	2	8
Ethiopia	0	1	0
Madagascar	1	1	0
Mozambique	1	0	0
French Equatorial Africa	3	2	1
French Morocco	6	5	6
Nigeria	3	1	0
Tunisia	6	6	2
Total	27	23	19
Middle East:			
Bahrein	2	2	2
Iran	2	2	9
Iraq	13	11	6
Kuwait	5	4	9
Lebanon			1
Trucial Coast	1	1	
Qatar	2	3	2
Saudi Arabia	11	9	7
Syria			3
Turkey	2	2	2
Total	38	34	41
Other Asia:			
Australia	3	2	2
Burma	2	2	2
Indonesia and British Borneo	31	31	21
India	6	4	12
Pakistan	5	5	
Japan	15	13	4
New Guinea	4	5	5
Philippines			1
Total	66	62	47
Grand total	634	622	544

New Lighting System Speeds Tanker Service

Tankers loading and unloading at night at Shell's Shellhaven refinery in England are getting speedier and more efficient service as a result of the world's first installation of a fluorescent jetty-lighting system. Eleven five-lamp, 80-watt industrial flameproof reflector fittings have been mounted on columns along three jetties. Lighting intensity is about 17 lumens per square foot. The tank farm is illuminated by 1,500-watt projection lamps and 400-watt mercury vapor units operated from the pump house. In installing the lighting system, its planners had to provide protection from corrosion of units by salt spray and to achieve even lighting over the jetties while contending with the numerous bollards placed at regular intervals.

Stanvac Buys Office Site

Standard-Vacuum Oil Co. has bought a 55-acre tract in Harrison, N. Y., a New York City suburb, as the site for a new headquarters office building.

Ground will be broken December 1 on a two-story air-conditioned building which will provide office needs for the approximately 700 persons in Stanvac's United States headquarters.

The purchase culminates 18 months of effort by the company to acquire a new office building site. Two months ago, it abandoned a rezoning application on a smaller tract in Rye, N. Y., also a Westchester County suburb.

Several of the large oil companies in New York have moved into new offices since the end of the war, but Stanvac is the only one to move outside the city proper. The company operates entirely in the Eastern Hemisphere and considers that offices in downtown New York City are not necessary.

New Drilling Firm Formed

A new contract drilling company, N. V. Nederlandsche Boor Mij. (Netherlands Drilling Co.), has been formed jointly by Drilling & Exploration Co., Inc., of Houston, Tex., and Dutch interests.

Clarence A. Wiggins, president of the Houston firm, said that while present activities of the newly formed company are confined to European and Middle Eastern areas, plans call for developing it into a world-wide contract-drilling company. Drilling & Exploration Co., Inc., holds controlling interest.

Headquarters have been established in Rotterdam, with Monty R. Garrison, formerly of Washington, D. C., as managing director. The company is currently running one rig on a contract basis in The Netherlands, Wiggins said.

AFRICA

Synthesis Plant to Profit

The oil-from-coal synthesis plant under construction at Coalbrook in the Orange Free State, South Africa, is expected to pay a dividend of 6 per cent, Dr. Eric Louw, the South African Minister for Economic Affairs, said recently at Capetown.

This estimate is after liberal provision was made for reserves and for union and provincial taxation, and, he added, it includes estimated revenue from the plant's byproducts.

The Coalbrook plant is the largest project of its kind now under construction. It is being built by South African Coal, Oil & Gas Corp., Ltd., a public-utility company in which the government holds all the shares. The contractor is M. W. Kellogg Co. A modified Fischer-Tropsch process will be used. Operations are expected to begin the middle of next year.

LATIN AMERICA

Xicalango Still Shut In

The Xicalango gas field in southern Mexico remains shut in pending conversion of the power plant in Ciudad del Carmen from diesel to gas fuel.

A 7-mile pipe line was laid about a year ago across the Laguna de Terminos to Ciudad del Carmen but it has not been placed in operation. The operator of the town's power plant will be the most important customer for the deliveries from the new line.

Ultimate plans call for construction of a line northeast to Merida and other cities in Yucatan, but this project has been blocked for the time being by the lack of a sufficient market for the Ciudad del Carmen line.

Mexican American Independent Oil Co. (CIMA), which discovered the Xicalango field under its percentage-of-production contract with Petroleos Mexicanos, has a location prepared for a new semiexploratory test, Rabon Grande 31, on the east flank of Rabon Grande field.

CIMA crews are completing roads to the location for another test, Chico Zapote, east of the Tonala River, and the company's deep wildcat, Macuiltepec 2, is still testing. CIMA recently let one of its rigs on a contract basis to E. W. Pauley for use in his drilling program in the Trevino field in northern Mexico. The equipment has been moved from CIMA's area of operations in the Isthmus of Tehauntepec to Trevino.

Dehydration Plant Planned

The natural-gas branch of the Argentine Government's fuels administration is moving ahead with plans for a dehydration plant at Plaza Huincul.

Recent reports are that Hudson Engineering has been contracted to purchase equipment, and that arrangements for construction are being made.

The plant will handle gas going into the line from Plaza Huincul to General Conesa. At the latter point, the line joins the main line from Comodoro Rivadavia to Buenos Aires.

The government organization has plans for the construction of four additional compressor stations, two on the main line, one at Plaza Huincul,

and an intermediate station between Plaza Huincul and General Conesa. It had been planned to build these stations through the use of Argentine lire balances in Italy, but it is now understood this proposal has fallen through.

Deep Test Under Way

Empresa Colombiana de Petroleos, the government company now operating De Mares concession in Colombia, was recently reported rigging up for a new 13,000-15,000 ft. deep test in the Infantas area of the concession.

A new National 130 rig is being used for the operation.

Deepest previous test in De Mares was taken to the Lower Cretaceous at 8,051 ft. Another development affecting exploratory operations in De Mares was the recent decision of the Colombian Supreme Court denying a private claim to subsoil rights on about 237,000 acres in the southern part of the concession. The decision is expected to free Empreso Colombiana to proceed with exploratory drilling in the area.

Venezuela Production Drops

Crude-oil production of Creole Petroleum Corp. in Venezuela showed another slight decline in June when the company's operated output averaged 727,945 bbl. daily, down 4,566 bbl. daily from the previous month.

The Lake Maracaibo area accounted for 590,478 bbl. daily of the June production, 6,245 bbl. daily came from other western Venezuela fields, and 131,222 bbl. daily from eastern Venezuela.

Creole's refinery runs during June averaged 145,799 bbl. daily, including 65,930 bbl. daily at Caripito and 79,869 bbl. daily at Amuay.

During the month, the company operated an average of 21 rigs and completed 12 wells, including four exploratory tests, two dry and two oil producers. One of the wells was in Temblador, 372 bbl. daily initial production and 4,105 ft. total depth, and the other was in the San Joaquin area, 1,000 bbl. daily initial production and 8,459 ft. total depth.

EUROPE

English Refinery Improved

The completion of a hydrodesulfurization unit at Shell's Stanlow refinery in Cheshire, England, next year will make this plant one of the most complete and fully integrated plants existing outside the United States.

The 85,000-bbl. daily capacity refinery has 25,000 bbl. daily capacity in catalytic cracking and 8,500 bbl. daily reforming capacity. Besides facilities for lubricating oils and asphalt, it has a modern chemical plant, a synthetic detergents plant, and a sulfur-recovery unit. The first platforming unit to be built in the United Kingdom is under construction at Stanlow, scheduled to begin operating before the end of this year.

The hydrodesulfurization plant employes the new "trickle phase" process developed by Shell at the Amsterdam laboratories of the Royal Dutch-Shell Group. In this plant, the oil meets a circulating stream of hydrogen, is heated, and the mixture passes over a fixed bed of catalyst. Reactor pressures are on the order of 300-750 psi., and temperatures, 650°-730° F., depending on the feedstock. A sulfur reduction of 85-90 per cent can be effected, and since the feedstock does not have to be vaporized, the process results in economies in heat-transfer equipment and fuel, as well as in hydrogen compressors, pipe lines, and valves.

The plant under construction at Stanlow is estimated to cost £1,000,000 ($2,800,000), and is being built almost entirely of British materials.

Sulfur Plant Operating

A sulfur-recovery plant has been placed in operation at the Fawley refinery of Esso Petroleum Co., Ltd., near Southampton, England.

Production of the plant is 40 long tons daily, or slightly more than 14,000 tons a year. Much of the sulfur in the Middle East crude used in the refinery emerges as hydrogen sulfide following catalytic cracking. The gas is converted by further treatment into liquid sulfur from which is obtained rock sulfur of plus 99.5 per cent purity. Fawley's sulfur production will be used entirely by the British textile industry.

Aramco's Newest "Community"—Uthmaniyah

This is the newest of the communities which have been built by Arabian American Oil Co. to serve its field operations in Saudi Arabia. Drilling and producing personnel living here handle part of one of the world's largest oil fields—the Uthmaniyah sector of the Ghawar area. Located about 93 miles south of Abqaiq, the Uthmaniyah community was first staked out in January 1951. The air-conditioned quarters are now occupied by more than a score of families and roughly 40 bachelor employes.

AUSTRALIA

Products Consumption Down

Over-all consumption of petroleum products in Australia dropped back slightly last year to a total of 5,188,600 tons, or about 104,000 bbl. daily.

The decline of 1.33 per cent from total consumption the previous year was due to several reasons. Greater availability of coal led to reconversion of oil burners. Deliveries for ships bunkers were down 6.3 per cent because of a reduction in shipping following government restrictions on imports. Another factor was a reduction in wheat acreage which cut the consumption of power kerosine by about 7 per cent.

On the other hand, gasoline consumption continued to gain. With increased vehicle registrations, motor fuel consumption was up nearly 6 per cent and comprised 44 per cent of total petroleum consumption. Consumption of principal products, including bunkers, was (Australian Petroleum Information Bureau figures):

Motor gasoline, 2,195,950 tons, or about 51,100 bbl. daily; power kerosine 271,910 tons, or 5,750 bbl. daily; lighting kerosine, 169,100 tons, or 3,600 bbl. daily; gas oil, 336,082 tons, or 6,900 bbl. daily; diesel oil, 739,015 tons, or 15,100 bbl. daily; and fuel oil, 1,156,116 tons, or 21,100 bbl. daily.

MIDDLE EAST

Israel Deep Test Slated

The first deep test for oil in Israel will be started late this year by Pontiac Petroleum, Ltd., an Alberta, Canada, corporation.

The company, managed from Toronto, has acquired about 800,000 acres of potential oil land under a drilling agreement with Israel Continental Oil Co., Ltd., and now has a crew of 30 in exploration in the area.

One block of acreage forms part of the Kurnub structure, reportedly the most promising yet found. The structure has a vertical closure approximating 2,500 ft.—the area encompassed by the closing contour approximating 15 miles long and 5 miles wide at its widest point.

A heavy-duty rig, capable of going to 15,000 ft., is being assembled for shipment in time to start work late in 1953.

Yemen Oil Search Set

The viceroy of Yemen and the West German firm, C. Deilmann Bergbaum, Bentheim, have signed a contract for oil exploration and development of the kingdom.

Seventy-five per cent of the expenditures and possible later profit falls to the government, with Deilmann carrying the remaining participation. The contract provides for 5 years of exploration and at least 20 years' joint exploitation if commercial production is found. While the entire country is covered, present work, consisting of geological studies under Dr. Oswald Schmidt, are confined to the coast.

The agreement, disclosed last week in Germany, was concluded last spring during a visit of the viceroy of Yemen to Germany. Dielmann is a well-known German company which has for many years been engaged in gas and oil production in Germany's Emsland province.

Kuwait Net: $46,500,000

Trading profit of D'Arcy Kuwait Co., Ltd., which holds the half share of Anglo-Iranian Oil Co., Ltd., in the Kuwait concession, was £58,503,073 (about $164,000,000) last year, according to financial data recently made public in London.

From the trading profit, Kuwait taxation absorbed £21,822,157 ($61,100,000) and United Kingdom taxes, £15,074,550 ($42,100,000). Net profit was shown at £16,606,261 ($46,500,000).

Kuwait last year produced 747,000 bbl. daily. During the first 5 months of this year, its output averaged 828,000 bbl. daily, exceeding that of Saudi Arabia and ranking the shaikhdom as the world's fourth largest producing country. The other half share in the operation is owned by a subsidiary of Gulf Oil Corp.

New Cracker on Stream

A new Houdriflow catalytic cracking unit has gone on stream at the 10,000-bbl. per day Lingen, Germany, refinery of Gewerkschaft Erdoel-Raffinerie Emsland. The new refinery is charging a mixture of Georgsdorf and Emlichheim crudes. The Houdriflow unit will charge a virgin distillate from the crude unit, plus the total vaporizable effluent from a Lummus coking unit which processes crude bottoms. In addition to conversion to higher-valued gasoline, the unit will also permit partial desulfurization of light coker and straightrun charge stocks.

FAR EAST

Japan Shifting to Oil

In a drive for greater efficiency, Japanese industry is making increasing use of heavy fuel oil, but the move is encountering resistance from the country's coal producers.

A recent special report to the Ministry of International Trade and Industry said that Japan must import a total of 2,200,000 kl. of heavy fuel oil, equivalent to a rate of about 38,000 bbl. daily, during 1953. Total Japanese petroleum consumption was estimated for 1953 at 4,500,000 kl. (77,600 bbl. daily), against 3,300,000 kl. (56,700 bbl. daily) in 1952.

By the end of 1953, the textile and pulp industries of Japan will each have replaced 27 per cent of their coal consumption with oil; iron and steel, 18 per cent, foodstuffs, 18 per cent; ceramics, 14 per cent; the electrical industry, 8 per cent; and the chemical industry, 5 per cent.

Meanwhile, the Japan Coal Mining Association has appealed to the ministry for government measures to relieve the continued pileup of abnormal coal stocks. The association requested, among other steps, that the government restrict imports of oil and the conversion from coal to oil in some industries. Coal stocks in Japan as of late June were estimated at about 4,120,000 tons, twice what is considered normal.

International Briefs

Oil royalties from Seria field in British Borneo will be used to finance a 5-year plan for development of public services, communications, and agriculture. The program costing the equivalent of about $33,000,000 will be carried out in Brunei, the tiny British protectorate where the field is located. The ruling sultan has authorized creation of a development fund and has appointed a committee to supervise the plan. Seria with an output of more than 100,000 bbl. daily is the largest producing area in the British Commonwealth.

A new company, Parafina del Plata, S.A., has been authorized by the Argentine Government to engage in the manufacture of lubricants, paraffin, and related products. When the company's facilities are in full production, Argentina's foreign-exchange expenditures for these products will be reduced by about $3,000,000 a year.

Standard Oil Co. of California's West Indies exploration subsidiary, Dominion Oil Co., Ltd., is carrying out geological and geophysical work with a limited crew on its acreage holdings in Trinidad. No exploratory wells are planned at present. As of April 30, the company had about 9,300,000 acres in Trinidad, on options, leases on freehold, Crown land leases, or on application for lease with the Crown. The company was organized about a year ago and has headquarters in Port of Spain.

Johnson Steps Up

Sunray veteran to manage plant, pipe-line operations

WHEN Sunray Oil Corp. finds itself with a good, tough refinery job, it seems to have become almost habit for the company to call on R. L. (Dick) Johnson.

In recognition of a quarter century of carrying out such jobs successfully, Sunray recently selected Johnson as manager of its reorganized refining and pipe-line department at Tulsa.

Johnson has been in the refining end of the oil business since 1921, when he supervised construction of the Oil State Refining Co. refinery at Allen, Okla. He became manager of that plant when operated by Homaokla Oil Co. from 1926 to 1928.

He is one of the oldtimers of the Sunray organization, having joined the company only about 7 years after its formation a little more than 32 years ago.

He spent 18 years as Sunray's refinery manager at Allen during the heyday of the Allen-Wewoka-Seminole boom. He was called upon to reorganize operations at the old Bell Oil & Refining Co. plant in Santa Maria, Calif., when Sunray purchased this unit in 1946. He returned to Oklahoma in late 1947 when the company was the successful bidder for the 25,000-bbl. per day catalytic cracking refinery at Duncan, operated during the war years by the War Assets Administration. Under his direction this plant was completely renovated and modernized. Recent improvements either now building or in the engineering stage are a fluid-coking unit, an alkylation plant, and a Platforming unit.

Johnson's personnel record at Sunray reveals that he was born at Leadville, Colo., on September 6, 1897, that he graduated from the Burgettstown, Pa., high school, and moved with his parents to Henryetta, Okla., where he worked as a mechanic's helper at the Eagle-Picher Lead Co. plant.

He was graduated from the Missouri School of Mines at Rolla, Mo., with an engineering degree in 1918 and was a World War I Signal Corps cadet. He is an Episcopalian, a thirty-second degree Mason, has been active in the Duncan Rotary Club, and in keeping with the fast pace of refining activity for the past 30 years, he hasn't quite had time to develop any hobbies—except work.

R. W. Griffith, Tulsa, has been made assistant manager of Sunray Oil Corp.'s refining and pipe-line department, now headed by **R. L. Johnson.** (See above). It was formerly known as the manufacturing, sales, and pipe-line department. **J. R. Ellis,** Tulsa, has been appointed manager of product pipe lines and special pipe-line projects. **F. W. Borden,** formerly manager of Sunray's West Coast operations at Los Angeles, is now manager of the company's refinery at Santa Maria, Calif., and **R. L. Harsin** is refinery superintendent.

M. T. Rader, formerly area geologist with U. S. Smelting, Refining & Mining Co. at Billings, Mont., has joined the geological staff of Union Oil Co. of California at Bismarck, N. D.

Tom Kirby, district geologist, is now in charge of Shell Oil Co.'s Green River district offices recently moved from Casper, Wyo., to Grand Junction, Colo. The new offices also will cover part of the Washakie basin. Other Shell geologists moved from Casper to Grand Junction are **Pat Hooper, Dick Matthews, John Cochran,** and **R. J. Schroeder.**

H. C. King, formerly controller of Ohio Oil Co. since 1941, has been elected financial vice president, a newly established position. King has been with the company since 1921 and was elected to the board of directors in 1946. **F. S. Slick** has been promoted from assistant controller to controller. Slick joined Ohio in 1926 and was head of the refining and marketing accounting department for 6 years before becoming assistant controller in 1941.

Kendall W. Miller has been promoted to superintendent of operations of the central pipe-lines division of Socony-Vacuum Oil Co., Inc., at Wichita. He had been district superintendent at Topeka, Kans., of the products pipe-line department.

Dr. Charles Beckett has been appointed chief of the thermodynamics section of the National Bureau of Standards and will supervise the section's experimental and theoretical programs. Dr. Beckett has been with the bureau since 1950. He formerly was a research associate for the American Petroleum Institute at the University of California.

C. Z. Hardwick has been elected executive vice president of Ohio Oil Co., Findlay, Ohio, succeeding **E. B. Redpath,** who retired September 1 after being with the company 48 years. Hardwick has been vice president and manager of refining and marketing since 1945 and has served on the board of directors since 1948. Redpath was made executive vice president in 1951 and had been a director since 1932. **H. H. West** has replaced him on the board.

C. Z. HARDWICK

E. B. REDPATH

J. J. Cosner, Jr., gas contract man in the producing department of The Texas Co., has been transferred from the company's Louisiana division at New Orleans to the West Texas division at Fort Worth.

Edward A. Koester, consultant, of Wichita, and **Karl A. Mygdal,** Pure Oil Co., Chicago, have been nominated as candidates for president of the American Association of Petroleum geologists for 1954-55. Other candidates are: for vice president, **Graham B. Moody,** Standard Oil Co. of California, San Francisco, and **Walter H. Spears,** Union Producing Co., Shreveport; secretary-treasurer, **William A. Gorman,** Rycade Oil Co., Houston, and **Elliott H. Powers,** incumbent, Southern Production Co., Fort Worth; editor,

PERSONALS

Armand J. Eardley, incumbent, University of Utah, Salt Lake City, and **W. T. Thom, Jr.,** Princeton University, Princeton, N. J. The A.A.P.G. officers will be elected by mailed secret ballots with the results being announced at the close of the association's thirty-ninth annual meeting in Kiel Auditorium at St. Louis, April 15.

F. F. Thomasson, production foreman, has been transferred by Sinclair Oil & Gas Co. from Midkiff, Tex., to Odessa, Tex.

Roual H. Dunn, formerly Phillips Petroleum Co.'s district superintendent at Hobbs, N. M., has traded positions with **Warren A. Roberts,** who has been assistant division superintendent at Midland, Tex., for 2 years. Dunn had been at Hobbs since 1945.

Joseph P. Yates, Jr., and **Philip A. Kahle, Jr.,** have been promoted to vice presidents of Refinery Engineering Co. Yates has been general manager of Refinery Engineering, Ltd., in Toronto, Ont., since early this year and will remain there in charge of the office. Kahle has been chief project engineer and is now in charge of all project and field engineering in Tulsa.

James Parker has been transferred by Arrow Drilling Co., and Arrow Drilling Co. of Texas as manager of the companies' reactivated operations in the Rocky Mountain area. He has been manager of the West Texas and New Mexico district. **Louis Roark,** formerly assistant manager in East Texas, Arkansas, Louisiana, and Mississippi, has replaced Parker.

G. M. Mitchell, formerly field production engineer for Continental Oil Co. at Bowie, Tex., is now a gas-storage engineer with New York State Natural Gas Corp. at Pittsburgh.

Lester L. Heblett, Jr., is now a production engineer for Standard Oil Co. of California at Coalinga, Calif. He had been a trainee for Standard at Taft, Calif.

R. D. Rogers has been made a vice president of Tide Water Associated Oil Co. and vice chairman of the eastern division operating committee. Rogers, who also is manager of the eastern division transportation and supply department in New York City, has been with Tide Water and its predecessors for over 30 years.

Luke W. Corbett, formerly plant chemist with Husky Oil Co., Cody, Wyo., has joined the staff of Miller-Warden Associates, asphalt consultants, Swarthmore, Pa.

J. W. Walters, formerly an engineer at Shreveport, has been promoted to district superintendent for Sohio Petroleum Co., at Tyler, Tex. District headquarters was previously at Shreveport.

Robert C. Gunness has been elected to the board of directors of Standard Oil Co. (Ind.) replacing **Harry F. Glair,**

R. C. GUNNESS

H. F. GLAIR

who has retired after 47 years with the firm. Gunness also is assistant general manager of manufacturing, having held that position since 1952. He joined the research department of Standard at Whiting, Ind., in 1938 as a group leader and was advanced to manager of research in 1947 after being assistant director from 1943 until becoming associate director in 1945. Glair, who also was director of purchases and manufacturing executive, was made manager of the Whiting refinery in 1929 and 2 years later was transferred to Chicago as assistant general manager of manufacturing. He was advanced to general manager of manufacturing in 1933 and elected to the board of directors in 1934. He became director of purchases in 1951.

Robert B. Takewell, of Borger, Tex., has been named executive vice president of J. M. Huber Corp. He had been vice president in charge of the company's carbon-black division, a position now filled by **A. Z. Hahn,** also of Borger.

R. W. Bybee, formerly in the West Texas division headquarters of Humble Oil & Refining Co. at Midland, Tex., has been promoted to assistant division geologist at Roswell, N. M. Other changes among geologists in Humble's exploration department of the West Texas division include the transferring of **W. B. Hoover** from Roswell, N. M., to the South Texas division at Corpus Christi, **B. R. Payne** from Houston to Midland, **A. A. Phillips** from Hobbs, N. M., to Albuquerque, N. M., **R. J. McLellan** from the Means district camp in Andrews County to Hobbs, and **W. L. Jordan, Jr.,** from Albuquerque to the Means district camp.

C. M. Allen, formerly assistant district geologist for Phillips Petroleum Co. at Houston, has been promoted to general gas geologist at Bartlesville, Okla.

Preston Parks has been named chief engineer for Colorado Interstate Gas Co., Colorado Springs, succeeding **C. B. Abbott,** who has retired after 25 years.

G. L. Howse has resigned as president of Howse Drilling Co., Abilene, Tex., to become an independent operator.

R. L. Young has been transferred by Phillips Petroleum Co. to its production department at Houston. He had been general field superintendent for Phillips in Venezuela with headquarters at Caracas.

Richard C. Kiddo has returned to Esso Standard Oil Co.'s Baltimore refinery technical department as group head in operations analysis after completing a 19-month assignment with the company's manufacturing department in New York.

Dr. John R. Brown, Jr., formerly vice president and director of research of Lambert Pharmacal Co., St. Louis, has joined Spencer Chemical Co. in Kansas City as general-works manager.

John H. Gatchell has joined Lion Oil Co. as a geologist in the production and exploration division. He will be attached to the company's central regional headquarters at Wichita. Gatchell had been assistant district geologist for Atlantic Refining Co. at Wichita for 5 years.

C. Merrell, formerly district superintendent for Phillips Petroleum Co., at Bella Vista, Venezuela, has been made assistant production manager at Caracas, Venezuela. **T. D. McMahan,** formerly district superintendent for Phillips at Mata Grande, Venezuela, has replaced Merrell at Bella Vista. The vacancy caused by McMahan's promotion has been filled by **G. W. Wilson,** who has been promoted from production foreman at San Roque, Venezuela.

PERSONALS

William Frederick Ellis has been promoted to district petroleum engineer at Jackson, Miss., by Union Producing Co.

William G. Allen has been promoted from party chief for Keystone Exploration Co., Houston, to resident supervisor of the company's northwest division and has established a branch office at Billings, Mont. Allen entered the geophysical field with The Texas Co. in 1936 and has been with Keystone since 1946.

C. F. Firmin of Findlay, Ohio, has been promoted from assistant to chief engineer of Ohio Oil Co.'s pipe-line department. He replaces **A. B. Johnson,** who has retired after 36 years with the company.

Raymond C. Hunt, formerly an engineer with Texas Eastern Transmission Corp. at Lufkin, Tex., is now an assistant division engineer with Gulf Interstate Gas Co. at Alexandria, La.

S. P. Weatherby, seismic supervisor, has been transferred by Donnally Geophysical Co. from Brownfield, Tex., to Roswell, N. M.

Richard J. Plank, formerly superintendent of distribution for Peoples Natural Gas Co., Pittsburgh, has been appointed general superintendent. Plank has been with Peoples since 1936 and is now in charge of all operating departments and divisions of the company. This includes supervision over production, transmission, distribution, all engineering activities, geological, land and lease departments, and field districts.

Raymond B. Kelly, manager of Pure Oil Co.'s Texas producing division at Fort Worth, has been elected senior vice president in charge of crude-oil exploration and production. Kelly, with Pure for 28 years, on October 1 will succeed **Comer Plummer,** who will continue as a director and member of the company's executive committee. **Robert W. McIlvain, Jr.,** assistant vice president for production, has been elected vice president for production operations. **James L. Morris,** assistant manager of the Texas exploration division, will succeed Kelly at Fort Worth as manager of the Texas producing division. **Lawrence L. McDonald,** production engineer, will be promoted to assistant division manager and will be in charge of production operations under Morris.

John L. McCray is now a petroleum engineer with A. O. Phillips, oil-producing company, at Dallas. He had been with Shell Oil Co. at Corpus Christi.

Frank R. Bailey, Jr., geophysicist, has been transferred by Stanolind Oil & Gas Co. from Harlingen, Tex., to Lake Charles, La.

Willard R. Wilson, tool pusher for Holm Drilling Co., has been transferred from Guymon, Okla., to Elkhart, Kans.

Dwight L. Clarke of Los Angeles has been elected to the board of directors of Bishop Oil Co., San Francisco. Clarke, who is chairman of the advisory council and a member of the board of directors of Occidental Life Insurance Co. of California, fills the vacancy created by the resignation of **William Wallace Mein, Sr.** Mein, who founded the company in 1920 and was president until May 1953, will continue to serve the company in an advisory capacity.

Hugh R. Kirkpatrick, formerly a reservoir engineer for Cities Service Oil Co. at Oklahoma City, is now a sales engineer with Black, Sivalls & Bryson, Inc., at Kilgore, Tex.

Morris E. Hays, tool pusher for Delta Drilling Co., in its Spanish operation, has returned to the United States and has been reassigned to Delta Gulf Drilling Co.'s operations in western Texas.

Dr. John P. Cogan, formerly head of the petroleum technical-service department of Esso Standard Oil Co. at Baton Rouge, has been named head of the newly organized technical department at the company's Bayonne, N. J., refinery. In Bayonne's new department, **Albert W. Wood,** former technical assistant in the process department, now heads the new process-engineering division. **William K. McOwen,** who headed operations analysis, is now assistant head of process engineering. **H. S. LaSeur,** technical assistant in oil movement and storage, has joined the process-engineering division and **E. J. Tierney,** former chief engineer, has been placed in charge of the mechanical-engineering division. He is assisted by **A. H. Collier,** formerly assistant head of mechanical engineering.

DEATHS

Clarance A. Pollard, 58, general manager of Standard Oil Co. of California's El Segundo refinery, died recently following a heart attack. He had been with Standard for 32 years and had been manager of the El Segundo refinery since October 1951, after serving as assistant refinery manager at Richmond, Calif., since 1940.

Jerry Simpson Shearer, 60, died recently at Englewood, N. J., following a long illness. He had been treasurer of Southwestern Development Co., an affiliate of Sinclair Oil Corp., since 1945.

Lonnie L. Evans, 62, an independent oil operator for 40 years, died August 26 at Brownwood, Tex. He had been active in development of the Fry sand production in Coleman and Brown counties, Texas.

C. L. Staats, 50, died recently at Charleston, W. Va. He was superintendent of oil and gas production for United Carbon Co.

George E. Kennedy, 69, died recently at his home in San Leandro, Calif. Until his retirement in 1941, he was executive vice president of Standard Stations, Inc., executive vice president of Standard Oil Co. of British Columbia, and a vice president of Standard Oil Co. of Texas.

Ralph L. Gay, 62, Louisiana oil man for several years, died recently at Converse, La. Gay, also a former Louisiana state senator, brought in the discovery well in the Zwolle field in 1930 and was active in developing the area.

Lenoir M. Josey of Houston, 59-year-old head of Lenoir M. Josey, Inc., producing and drilling company, died August 31 in Baltimore. He held interests in production in South Liberty and Saratoga fields, South Texas.

George W. Gilliland, Jr., 40, an independent oil and gas lease operator and associate of Dewey Portland Cement Co., died August 25 at Bartlesville, Okla.

Steam Turbine Vs. Electric Drive

. . . for the cat cracker blower

• Investment cost • Operating Cost • Flexibility of operation • Operating record

by H. C. Mayo*

THE current trend in cat cracker air-blower drives appears to be toward the greater employment of electric-motor drivers. Many of the cat cracking units which have been put on stream recently or are now under construction have gone over to the electric motor.

From economic studies made of steam versus electric drivers it has been concluded that:

1. Plant investment costs can be substantially reduced by the use of electric-motor drivers in cases where the steam system is inadequate and where reliable power is available without too great a capital expenditure.

2. The operating cost for low-pressure condensing steam-turbine installations is higher in most areas than for electric motors supplied by purchased power.

3. The operating cost for high-pressure high-temperature steam-turbine installations is lower in many areas than for electric motors. However, in areas where cheap hydroelectric power is available, the operating cost of motor drivers may be lower.

4. The maintenance costs of electric motors and the electrical system are lower than for turbines, condensers and cooling towers.

5. Cooling-water requirements are reduced from 30 to 50 per cent and space for cooling towers and steam generators is greatly reduced by the use of motor driven compressors.

6. Well-designed electrical systems will provide the required service continuity.

7. Commercially available constant speed centrifugal compressors have sufficient operating range for any application in a fluid catalytic cracking unit.

*Equipment engineer, M. W. Kellogg Co. Paper presented at A.S.M.E. meeting Los Angeles, June 28-July 2, 1953.

Factors in Economics

It is understandable that the designers of the first fluid catalytic cracking unit, which went on stream in 1941, chose a steam turbine as the driver for the air blower. However, in today's highly competitive market it behooves all engineers to examine carefully the economics of the various phases of design.

Economics affecting the selection of motor or turbine drivers center principally around (1) the installed cost of steam generating equipment, (2) cost of fuel used in steam generation, (3) the capital expenditure necessary to bring reliable power to the site, and (4) the cost of electricity. All of these vary widely in different parts of the country. Cost of steam-generating equipment used for comparison purposes is based on the costs of outdoor type plants in the southern states.

The practice of different electric-supply companies with regard to providing multiple feeders with automatic switching between feeders varies. Some companies provide a single service at no charge with additional services being provided at the customer's expense. Other companies provide dual feeders at no additional charge. If the existing electric service is not reliable, the service company should be contacted before economic comparisons are made to determine charges for bringing the required feeders to the refinery.

The cost of electricity, gas, and fuel oil used in the present comparison are based upon those obtained from a number of cities as shown in Table 1. Cost figures used do not include cost of steam or electric lines outside the unit limits.

Consideration must be given to the fact that off-grade fuels are sometimes available in a refinery at less than listed marked values for commercial-grade

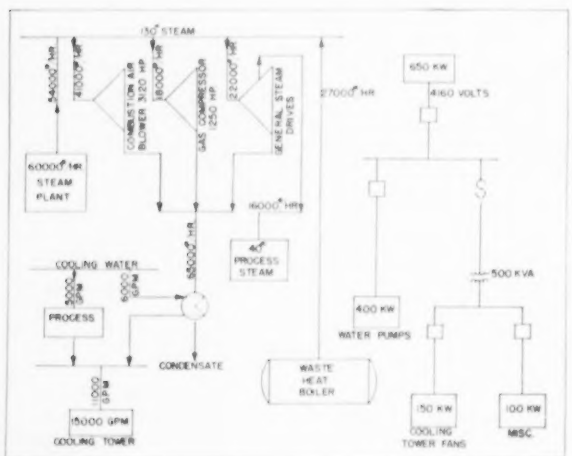


Fig. 1—Small fluid catalytic cracker, steam-turbine drives.

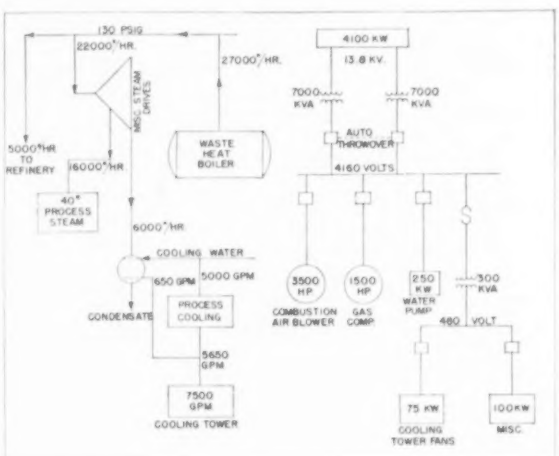


Fig. 2—Small fluid catalytic cracker, electric-motor drives.

fuels. However, any fuel burned must be assigned a price equal to the return that could be realized by its sale. Many refineries burn large quantities of natural gas to supplement refinery waste fuel.

Steam vs. Electric Costs

A brief comparison is given of steam drive versus electric drive in the following three cases:

A—Small unit—condensing turbine

B—Small unit—back-pressure operation

C—Large unit—condensing turbine.

Case A—Small Unit—Condensing Turbine

Cost estimates are based on unit for which utility balances of Figs. 1 and 3 were obtained.

TABLE 1—COST OF ELECTRICITY, GAS, AND FUEL OIL IN DIFFERENT CITIES

Location—	Gas, cents per million B.t.u.	No. 6 fuel oil, dollars per bbl., 6 million B.t.u.	Electricity, cents per kw.hr.
Boston			1.02
Denver	14.5		0.70
Detroit	40.00	3.00	1.01
East Chicago, Ind.	43.3	3.42	1.065
Houston	8.00	1.00	0.52
Little Rock	13.58	1.74	0.70
Los Angeles	22.1	2.00	0.524
Minneapolis		2.31	1.25
Montreal		2.73	0.605
Newark		2.55	0.835
New Orleans	13.00		0.75
New York City	27.4	2.10	1.3
Philadelphia	29.1	2.03	0.85
Pittsburgh	39.9		0.9
Redwood City	29.8	1.90	0.841
San Francisco	29.8	1.90	0.841
Toronto			0.5
Tulsa	13.00	0.90	0.74
Tucson	27.00		1.1
Wichita	16.5	1.10	0.686
Winnipeg	(*)	2.38	0.434

Electricity cost based on 5,000 kw., High P.F., 7,000 hours annual use.

*Not available.

Small unit, condensing turbine . . . Fig. 1 shows the utility conditions for a small unit employing condensing steam-turbine drivers. Driving power is largely concentrated in the combustion air blower, gas compressor, and refrigeration compressor.

The waste-heat boiler generates 27,000 lb. of steam per hour, whereas the process requirements are only 16,000 lb. per hour. When using condensing steam-turbine drivers on the large machines, a steam flow of 54,000 lb. per hour from the refinery system to the unit is necessary. If no spare steam-generating capacity exists, this unfavorable balance necessitates the installation of a 60,000-lb. per hour steam generator. The condenser for the three large turbines requires 6,000 g.p.m. of cooling water out of a total of 11,000 g.p.m. for the entire unit.

Small unit, electric drive . . . Fig. 2 shows the utility diagram for the same unit using electric-motor drivers on the air blower and gas compressor. Steam produced in the unit at 130 psig. is used in back pressure or condensing extraction drivers to supply the process steam requirements. Steam returned to the refinery is treated as a credit in the economic studies. Use of motor drivers changes the steam requirements from a 54,000-lb. per hour deficit to a 5,000-lb. per hour surplus. Cooling water is reduced from 11,000 to 5,650 g.p.m. and use of electricity is increased from a rate of 650 to 4,100 kw.

	Turbine Drive	Motor Drive
Steam generator, 60,000 lb./hr.	$400,000	
Compressors, condensers, drivers	185,000	$176,000
Cooling tower and accessories	200,000	110,000
Piping	15,000	
Electrical system and starters	29,000	151,000
	$829,000	$437,000

Investment savings on electric drive: $392,000.

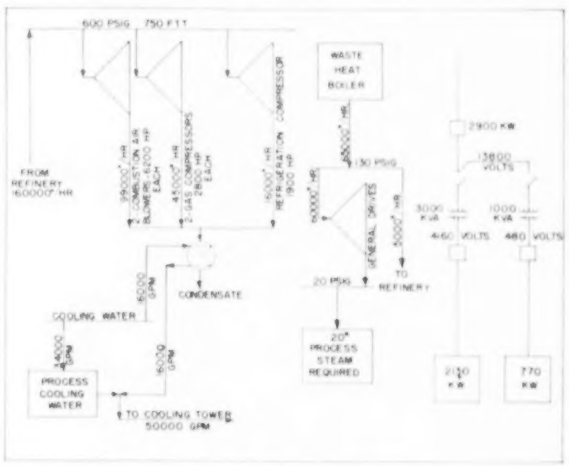


Fig. 4—Large fluid catalytic cracker, steam-turbine drives.

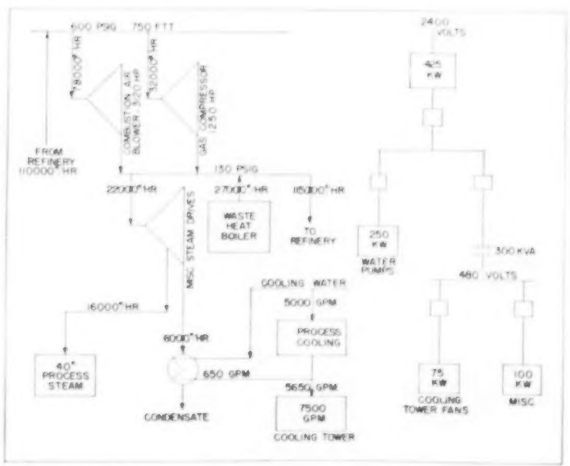


Fig. 3—Small fluid catalytic cracker, back-pressure turbine drive.

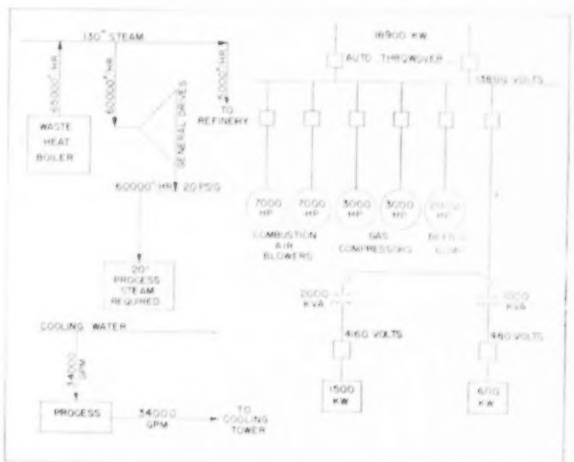


Fig. 5—Large fluid catalytic cracker, electric-motor drives.

TABLE 2—EQUIVALENT COST OF FUEL AND ELECTRICITY CONDENSING STEAM TURBINES VS. ELECTRIC MOTOR DRIVERS FOR SMALL FLUID CATALYTIC CRACKER

(130-psi. steam, Reference Figs. 1 and 2)

Fuel cost		Cost of steam before amortization, cents per 1,000 lb., 150 psi.	Cost of electricity to write off additional investment for steam system—writeoff time in years			
Gas, cents per million B.t.u.	Fuel oil per bbl.		3	4	5	6
5	$0.30	14	0.781	0.647	0.565	0.51
10	0.60	22	0.920	0.784	0.700	0.646
15	0.90	29	1.04	0.902	0.820	0.766
20	1.20	37	1.17	1.04	0.956	0.903
25	1.50	45	1.31	1.17	1.09	1.04
30	1.80	52	1.43	1.29	1.21	1.16

7,000 hours' operation.

Table 2 shows the equivalent costs of fuel and electricity for writeoffs of from 3 to 6 years. Crossreference to Table 1, "Fuel and Electricity Costs in Different Areas," will indicate areas in which electric motor and steam turbine drives can be economically applied.

Case B—Small Unit—Back-Pressure Operation

Fig. 3 shows the utility diagram for a unit of similar size as in Case A driven by 600-psig.—750° F. throttle temperature (T.T.) steam with topping turbines exhausting to a 130-psig. system. This system requires 110,000 lb. per hour of 600 psig.—750° F. T.T. steam and results in a net of 115,000 lb. per hour to the 130-psig. refinery system.

The comparison of the estimated cost of the steam system and turbine installation (Fig. 3) and the electrical system and motor drives (Fig. 2), for this case is presented below:

	Turbine Drive	Motor Drive
Steam generator, 125,000 lb./hr.	$725,000	
Compressors, drivers	165,000	$176,000
Cooling tower and accessories	110,000	110,000
Piping	10,000	
Electrical system and starters	29,000	151,000
	$1,039,000	$437,000
Investment savings on electric drive	602,000	
Credit for 125,000 lb./hr. steam generator	675,000	
Additional cost of electrical system if credit is taken for cost of 150-psig. steam generation	$73,000	

If the 130-psi. steam is needed and construction of steam-generating capacity is necessary, credit can be taken for the cost of the low-pressure steam generator and the resulting installed cost is less than the cost of the electrical system. The annual operating cost of the back-pressure steam-turbine drives, without amortization of the steam system, is only a fraction of the annual operating cost of electric-motor drivers. However, if the existing 130 psig. steam generating equipment is adequate but it is decided to discontinue its use and supply the 130 psig. requirements from the high pressure turbine exhaust, then the difference in investment is approximately $602,000. If standby steam generating capacity is required, the differential cost will be increased accordingly.

Table 3 shows the equivalent costs of fuel and electricity for writeoffs of from 3 to 6 years. Crossreference to Table 1, "Fuel and Electricity Cost in Different Areas," will indicate areas in which the different systems can be economically applied.

Case C—Large Unit—Condensing Turbine

Figs. 4 and 5 show the utility flow diagrams for a large fluid catalytic cracker employing condensing steam-turbine drivers and electric-motor drivers, respectively. The following tabulation shows the estimated investment cost of the two:

	Turbine Drive	Motor Drive
Steam generator, 180,000 lb./hr.	$925,000	
Compressors, condensers, drivers	805,000	$873,000
Cooling tower and accessories	654,000	442,000
Piping	95,000	
Electrical system and starters for compressors	63,000	206,000
	$2,542,000	$1,521,000

Investment savings on electric drive: $1,021,000.

The additional investment cost of the steam system is approximately $1,021,000.

The greater economy in the use of high-pressure high-temperature steam is indicated in Table 4. Crossreference to Table 1 shows that there are many areas where the lower operating cost of the steam system and steam drivers will result in an indicated payoff of less than 3 years. The tables also indicate that there are areas where the writeoff will exceed 5 years.

Reliability of Electric Drive

Either forced air ventilated synchronous or induction motors with air taken from an elevated intake stack provide installations suitable for refinery service. Large numbers of such machines have been in successful operation on other refinery drives, such as slow-speed reciprocating compressors, for years.

Fear of power failure . . . The dependability of the electric motor is attested to by its use in preference to steam turbines as the accepted driver for boiler feed pumps and forced and induced draft fans in central station electric generating stations. Control equipment for induction motors is simpler than for synchronous motors. In addition, induction motors develop higher torques and are less affected by voltage

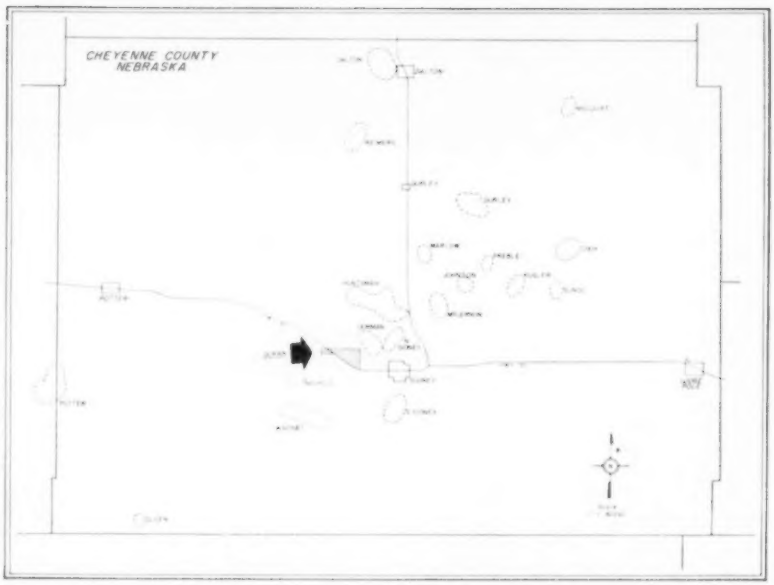
(Continued on page 119)

TABLE 3—EQUIVALENT COST OF FUEL AND ELECTRICITY BACK PRESSURE STEAM TURBINES VS. ELECTRIC MOTOR DRIVES FOR SMALL FLUID CATALYTIC CRACKER

(600-psi. steam, Reference Figs. 2 and 3)

Fuel cost		Cost of steam before amortization, cents per 1,000 lb.		Cost of electricity to write off additional investment for steam system—writeoff time in years			
Gas, cents per million B.t.u.	Fuel oil per bbl.	150 psi.	600 psi.	3	4	5	6
5	$0.30	14	15	0.815	0.616	0.498	
10	0.60	22	24	0.838	0.639	0.522	
15	0.90	29	32	0.871	0.673	0.556	
20	1.20	37	41	0.903	0.705	0.587	0.511
25	1.50	45	50	0.930	0.732	0.615	0.537
30	1.80	52	58	0.960	0.763	0.645	0.568

7,000 hours' operation.



IN THE DENVER-JULESBURG BASIN is located Doran oil field, Cheyenne County, Nebraska, as shown by solid arrow on this place-fix map. (Fig. 1.)

4,000 Ft. in 2 Days . . . And With a Single Bit

Digging's fast and easy in Nebraska's Doran oil field

by Joseph A. Kornfeld

FAST, easy digging in soft Cretaceous shales is typified by the experience of Delaware Drillers, Inc., San Angelo, Tex., contractor, in making hole in the new Doran oil field of Cheyenne County, Nebraska. Only one bit was required under the surface pipe (225 ft.) to reach a depth of 4,000 ft. and this interval was cut in only 2 days.

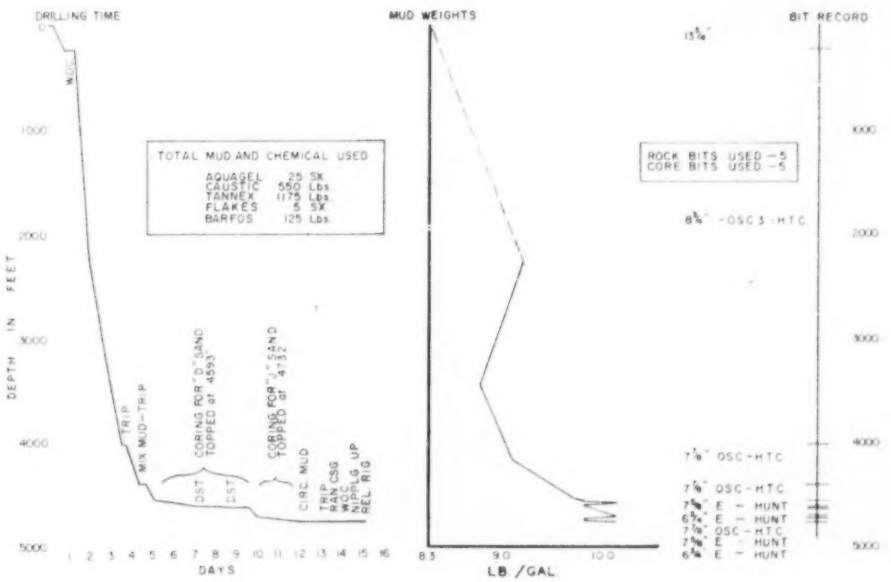
Doran oil field, 3 miles west of Sidney, Neb., appears to be one of the more important of recent discoveries made on the Nebraska side of the Denver-Julesburg basin. Since field discovery on April 5, 1953, nine oil wells have been completed from the Dakota "D" sand (depth 4,800 ft.) with a current field production rate of 600 bbl. per day. In addition, one gas well has been finaled. All wells are owned by The Chicago Corp. and Republic Natural Gas Co. (Fig. 1).

Development may attain in areal extent the prolific Dorman oil field to the northeast in the same township *(See The Oil and Gas Journal, January 11, 1951, pages 68-70).*

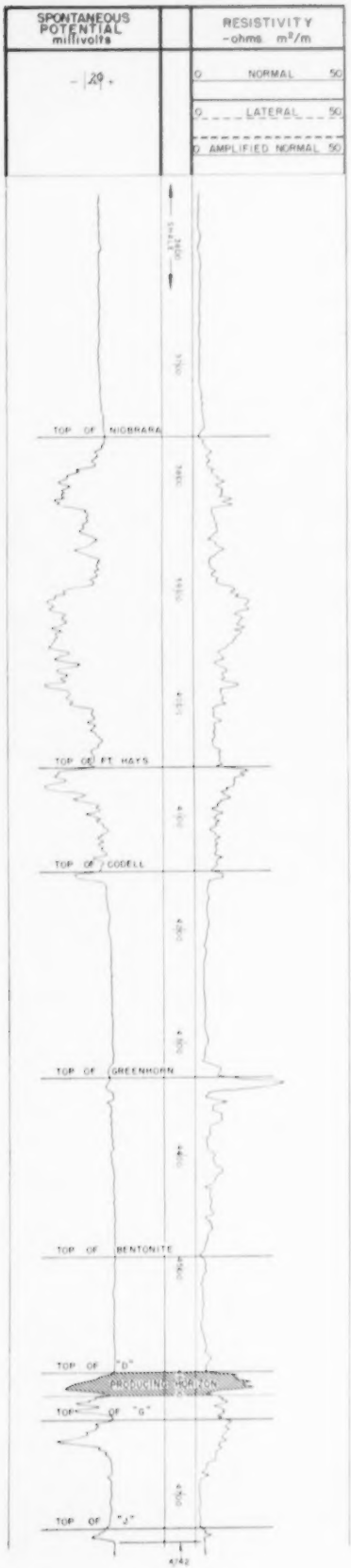
Discovery well . . . Doran field was discovered by The Chicago Corp. and Republic Natural Gas Co. 1 Doran Farms, Inc., NE NE SW 27-14n-50w. Initial production was 104 bbl. of oil per day on the pump. Producing horizon is the "D" sand in the Dakota series of Cretaceous age.

Drilling Practices

Delaware Drillers, Inc., are making hole currently at 12 Doran Farms, NE NE NW 27-14n-50w, on a 4,800-ft. contract in development of the "D" sand reservoir. Tools employed here are the firm's Rig No. 5 which is a Model T-20 draw works, a 200-input hp. rig driven by a twin 260-input horsepower

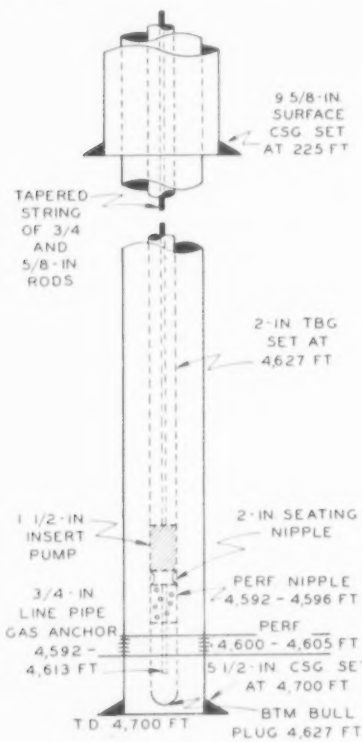


DRILLING PROCESSES used in a typical Doran pool well are shown in a series of charts and tables at left. (Fig. 2.)



TYPE SECTION (left) shows Cretaceous sediments from the Niobrara to the "J" sand. (Fig. 3.)

SETTING DIAGRAM (below) is employed for a "D" sand oil well in Doran field. (Fig. 4.)


9 5/8-IN SURFACE CSG SET AT 225 FT
TAPERED STRING OF 3/4 AND 5/8-IN RODS
2-IN TBG SET AT 4,627 FT
1 1/2-IN INSERT PUMP
2-IN SEATING NIPPLE
PERF NIPPLE 4,592 - 4,596 FT
3/4-IN LINE PIPE GAS ANCHOR 4,592 - 4,613 FT
PERF 4,600 - 4,605 FT
5 1/2-IN CSG SET AT 4,700 FT
BTM BULL PLUG 4,627 FT
T.D. 4,700 FT

unit. The engine-mounted torque converter with two forward draw-works speed ratios to the drum and rotary table incorporates all of the well-established advantages of torque-converter-equipped hoisting units.

The Model C-150 B slush pump with 12-in. stroke, and equipped with 7¼-in. liners, is independently powered by a 130-hp. engine. Rig is mounted on a 97-ft. steel mast with an 8-ft.-high substructure.

Casing and cementing . . . Surface hole is cut with a 13¾-in. bit to a depth of 225 ft. Hole is cased with 9⅝-in. 32.3-lb. H-40 surface pipe to that depth and 175 sacks of cement are placed behind the pipe.

Shoe is drilled with an 8¾-in. bit and this hole size carried to 4,000 ft. or into the Niobrara chalk; at that depth hole size is reduced to 7⅞-in. and that bit size used in drilling to total depth which is usually the "J" sand of the Dakota series. Long string is 5½-in. 15.50-lb. J-55 casing run to setting depths of from 4,600 to 4,700 ft. Approximately 175 sacks of slow-set cement (with 2 per cent jel added) are placed behind the pipe. Only five rock bits are used. See Fig. 2.

Only two 6-in. o.d. drill collars are used in the string. Maximum bore-hole deviation permitted is 3° and contractor stays within this limit.

Mud properties . . . In cutting the soft, thick Cretaceous shale section down to the Niobrara chalk, mud weight is constantly increased until a maximum of 9.2 lb. per gallon is reached at 2,200 ft. From that depth, mud weight is cut back to a minimum of 8.8 lb. per gallon at 3,500 ft. and then increased to 9.1 lb. per gallon at 4,200 ft. which depth is below Niobrara, Fort Hays, and Codell markers.

At the latter depth, mud weight is increased to a maximum of 10.1 lb. per gallon for drilling and coring the pay sands in the Dakota series. Mud properties at total depth are: weight 9.8 per gallon; viscosity 70 seconds, A.P.I.; water loss 6 cc.; and wall-cake thickness 1/32-in.

Coring and drill-stem testing . . . A total of five 6¾ and 7⅝-in. core bits are used in coring for the "D" and "J" sands. Usually only two drill-stem tests are conducted to evaluate productivity of these two sands. (Fig. 3.)

Completion Practices

Casing is gun perforated opposite "D" sand. Usually 5 ft. of section is shot and with a density of 4 shots per foot.

Tubing string is 2-in. EUE, eight round thread, J-55 pipe, set at about 4,600 ft. String is bull plugged on bottom with one joint of pipe between the bull plug and a 3-ft. perforated nipple arranged so that a ¾-in. gas anchor can be utilized for installation of pumping equipment. Immediately above the perforated nipple, a 2-in. seating nipple is installed for setting a 1½-in. insert-type pump. Tapered rod string is composed of ¾ and ⅝-in. rods (Fig. 4).

Production Practices

Artificial lift equipment . . . All oil wells in Doran field are placed on the pump on completion and equipped with a Type DB-114 pumping unit. Prime mover is a Model C-96 engine and casing-head gas is used for fuel.

Tank batteries are comprised of two 12 by 20-ft. welded steel tanks, a vertical 30-in. by 9-ft. 125-psi. w.p. separator and a 6 by 20-ft. 45-psi. w.p heater-treater. Wells are connected by individual flow lines into a header at the battery so that any one well may be bypassed through a vertical separator for conducting individual well-productivity tests.

During extreme winter conditions, an oil-circulating system is operated from the stock tanks back through the heater employing a small pump to keep the oil from congealing on account of its high pour point.

Discovers Goldmine in Oilfields

ON ROAD TO PROFIT: TD-14A pushes road to Humble Oil Company well in Talco Field.

Rugged, Reliable Internationals Prove Real Money-Makers for Texas Contractor

John D. Wright, oil field contractor, Talco, Texas, bought his first International in 1941. Since then he has used nothing else for oil field preparation.

There is one big reason why: he *makes more money*.

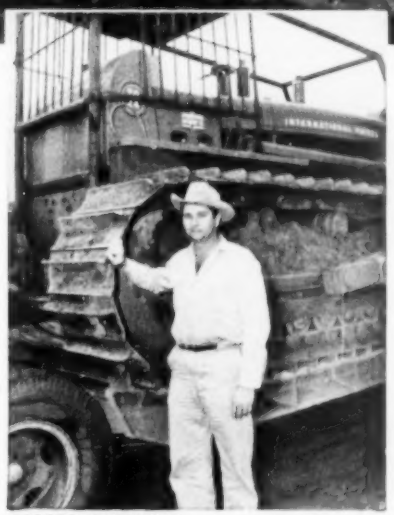
Here's the way he puts it:

"I had one TD-14 I used for over five years. This crawler gave me better service and made me more money than you could ever expect from any tractor its size.

"I've never seen a tractor that could out work my Internationals. I now have three TD-24s for land clearing and heavy dirt jobs and a TD-14A for special oil field work.

You can get this kind of bonus performance, and make it mean more profit for you. Get the complete story from your International Industrial Distributor.

INTERNATIONAL HARVESTER COMPANY, CHICAGO 1, ILLINOIS



RECORD DURABILITY and top performance keeps contractor J. D. Wright sold on Internationals. Here he is beside his newest addition, a rugged TD-24—the most powerful crawler on the market.

IT'S INTERNATIONAL all the way with Mr. Wright. Here one of his TD-24s is moved to new job location on trailer pulled by IH L-190 series truck tractor.

INTERNATIONAL

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POWER THAT PAYS

Dimensional Analysis . . .

How to use it in working with scale models

by R. F. Nielsen*

IN certain field and engineering problems where a solution cannot be obtained by purely mathematical means, it may be possible to obtain desired answers by studying a model, or small replica, of the larger object called the prototype. The model is subjected to certain imposed conditions which are known to be true for the prototype. By observing the behavior of the model and by applying the proper numerical relations to the data taken, the behavior of the larger prototype is determined. These numerical relations, and the numerical relations which must be followed in setting up the model, are determined by the rules of dimensional analysis.

The common quantities of mechanics have "dimensions" given in terms of the fundamental physical units of mass, length, and time, hereinafter designated as M, L, and T. It is obvious that velocity has the dimensions of L/T, acceleration the dimensions of L/T^2, force (= mass × acceleration) and dimensions of ML/T^2, pressure the dimensions of M/LT^2, etc. The dimensions of viscosity, which will be needed in what follows are M/LT.

Any algebraic equality directly derivable from fundamental laws should "balance dimensionally," that is, M, L, and T should appear to the same respective powers on both sides of the equation. This may be simply illustrated by Poiseuille's law for horizontal viscous flow of a liquid through a circular capillary. The law is:

$$q(\text{cc./sec.}) = \frac{\pi r^4 \Delta P}{8 \mu l} \qquad (1)$$

the symbols having the usual meaning, the units being C.G.S. Both sides should have the dimensions of L^3/T, and by putting the dimensions of length, pressure, and viscosity in the right side of the equation, this is found to be true.

This rule of dimensional balance is sometimes useful in reverse. If we knew that the flow was proportional to the product of powers of r, ΔP, μ, and l, but wished to determine these powers we could write:

$$L^3 T^{-1} = (L)^x (ML^{-1} T^{-2})^y \times (ML^{-1} T^{-1})^z (L)^w \qquad (2)$$

and equate powers of M, L, and T on the two sides. (The brackets refer to r, ΔP, μ, and l in that order). This would give only three equations, so the power of one quantity, say that of the length of capillary, must be known. If the w of the last equation is assumed to be —1, then, by the laws of algebraic multiplication, x — y — z — 1 = 3, y + z = 0, 2y — z = —1. This gives Poiseuille's law except for the constant $\pi/8$.

It is important that all physical factors be included in a dimensional balance like the preceding. Suppose one considered a vertical viscosimeter (Fig. 1) the pressure at the two liquid levels being atmospheric. One might offhand say that the flow rate depends on the height between levels, the fluid density, the capillary radius, the viscosity, and the length of capillary, ignoring minor effects in the wider parts of the viscosimeter. However, when an attempt is made to set up the proper relation involving these quantities it is apparent that something is wrong dimensionally. The strength of the earth's gravitational field, although a "constant" for the present purpose, cannot be overlooked as one of the contributing factors. This has the dimensions of acceleration, and, when the fluid "head" is written in the usual manner, ρ gh, no difficulty is encountered, the flow being given by $\pi r^4 \rho gh/8 \mu l$ in C.G.S. units.

The most important use of dimensional analysis is in the construction and study of a "scaled" model. To take a simple case, one might make a small model of the vertical viscosimeter shown, and from its flow behavior determine that of the prototype. According to the rules, if there is a quantity, such as viscosity, having dimensions $L^a M^b T^c$ then the ratio of its magnitude G in the prototype to the magnitude G′ in the model is given by:

$$G/G' = (L/L')^a (M/M')^b (T/T')^c \qquad (3)$$

where the ratios in brackets are the "scale ratios" for the experiment. Each of these three scale ratios must be a constant for all physical quantities affecting the experiment.

In the case of the vertical viscosimeter, we

*Author is associate professor, petroleum and natural-gas engineering, Pennsylvania State College.

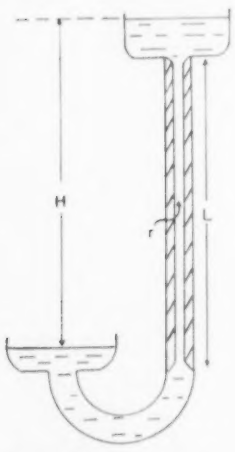

Fig. 1—Capillary viscosimeter.

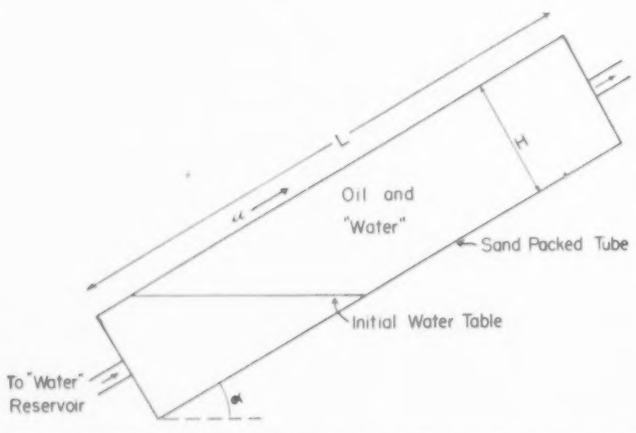

Fig. 2—Model at water-driven reservoir, L and H 1/36 of the corresponding values for the reservoir.

may take $L/L' = 4$. Now we cannot arbitrarily fix T/T', since g is the same for model and prototype, or $g/g' = 1$, so, from the dimensions of g, $T/T' = L/L' = 2$. In the case of the horizontal viscosimeter g would not have to be reckoned with. The value M/M' must be selected so as not to give unreasonable values of density or viscosity ratios, but for convenience let $M/M' = 32$. Then $\rho/\rho' = 0.5$, and $\mu/\mu' = 4$, from the dimensions of density and viscosity. From the above ratios the volumetric flow ratio, q/q' is 32, which could have been predicted from Poiseuille's law.

Scaling a Laboratory Flooding Experiment

When a model of a reservoir under production is to be made and its behavior studied, the scaling of the various quantities involved is not so simple. As a matter of fact, the construction of a true "model" would hardly be possible because of permeability variations, the small size of the well bore compared to field dimensions, etc.

A number of scaled laboratory experiments have been made in which oil was displaced by a water drive.[2,3] In some of these the drive was linear, in others radial. In the case of a linear drive the model can be regarded as representing the reservoir up to a line near a row of wells. We might take as an example a natural water drive, where gravitational effects, dip angle, and capillary forces are to be considered in addition to the usual factors of viscosities, permeabilities, and relative permeabilities. It is assumed that the gas saturation is zero. The original oil-water saturation distribution and the location of the water front would be in accordance with the supposed reservoir. The following analysis is that of Leverett, Lewis, and True.[2]

Let the linear dimensions be in the ratio of 36 to 1. If gravitational effects are significant, one is handicapped by the fact that g, the gravitational constant, is the same in the model and prototype. Thus $L/L' = 36$, but $g/g' = LT'^2/L'T^2 = 1$, so the time scale is fixed at $T/T' = 6$.

Since we are interested in the changes in the flow rates and saturation distribution of oil and water, the formula for the fractional flow of water is convenient:

$$f_w = \frac{1 + K_o/Q\mu_o\,[(dP_c/dx) - g\,\Delta P\cos\alpha]}{1 + (K_o\mu_w)/(K_w\mu_o)} \qquad (4)$$

where α is the angle which the direction x makes with the horizontal P_c is capillary pressure in atm., Q is total flow cc./sec. per sq. cm. in direction x, ΔP is the density difference for water and oil (C.G.S.), $g = 0.97 \times 10^3$ and K and μ are effective permeabilities and viscosities in Darcy law units.

In deciding upon further scaling, one is again handicapped by the difficulty of varying ΔP, in fact, we may as well say $(\Delta P)/(\Delta P') = 1$, hence $ML'^3/M'L^3 = 1$, $M/M' = 36^3$ and all other numerical ratios, such as viscosity ratio, are fixed. From Equation 4, the quantities yet to be properly scaled are Q, P_c, K_o, K_w, μ_o, and μ_w. From the flux density, $Q/Q' = (L/T)/(L'/T') = (L/L')^{1/2} = 6$. Pressure has dimensions M/LT^2, and combining with previously established relations for density and time, $P_c/P_c' = L/L' = 36$. In finding scale ratios for the remaining quantities it is desirable[1] to recall certain relations for sand in general. From surface physics and the relation of average pore diameter to permeability, the capillary pressure is proportional to γ, the interfacial tension, and inversely proportional to the square root of the permeability.

The surface tension appears only as P_c and need not be scaled directly. If for the liquids chosen, $\gamma/\gamma' = 2$, the $K/K' = (\gamma P_c/\gamma' P_c)^2 = 1/324$. Thus a 1-darcy sand in the model represents a 3-md. sand in the prototype. This is a serious limitation which can only be overcome by using a larger model. Of course, if capillary forces were to be neglected, then P_c would not have to be scaled, and the difficulty of this permeability ratio would be avoided.

The effective permeabilities are presumably scaled when the permeability is scaled, if the relative permeabilities are the same function of saturation for all permeabilities. This is not strictly true, but for similar sands, is a fair approximation. Furthermore, if the model goes through the same saturation history as the prototype at all points, on the relative scales, then scaling the permeability should also scale the effective permeabilities to oil and water.

It is noted that the permeability was not scaled from its dimensions (L^2) but from the necessity of yielding the correct scale for P_c. Since K appears always in the ratio K/μ it is sufficient to scale this ratio which has dimensions L^3T/M, or $(K/\mu)/(K'/\mu') = 6$. $K/K' = 1/324$, so $\mu/\mu' = 1/1944$ for both oil and the aqueous phase. Again it is apparent that the linear scale should have been chosen somewhat less, say 16 to 1 to avoid the use of extremely viscous liquids in the model. For instance a syrup would have to be used for the "water" phase.

Fig. 2 shows how a model of an updip flood might be set up. The change in produced water-oil ratio with time, for instance, should follow that for the prototype, with a time scale of 6 to 1.

The scale ratio for dimensionless quantities such as dip angle, porosity, ratio of height to length, etc., is unity. That is, altering any dimensionless quantity in the model is equivalent to altering the same quantity by the same amount in the prototype. In making laboratory flow studies,[1] therefore, it is often convenient to vary systematically certain dimensionless groups such as $L/(K)^{1/2}$, viscosity ratios, etc. The effect of the variations serves to compare reservoirs in which these quantities vary in the same manner.

For instance, if a certain curve is obtained when "breakthrough recovery" is plotted against the length/height ratio, the same curve should be obtained regardless of the absolute magnitudes of length and height, provided other pertinent quantities are properly scaled. Of course, if the absolute magnitudes but not the ratio are varied, then the models are merely models of each other. The capillary "end effect" will not give the same relative effect in all models unless the quantities controlling this effect are scaled accordingly. As pointed out in the example given, there are usually serious limitations on the amount of scaling that can be done. In any case the models are not models of the reservoir as far as end effect is concerned, unless wells of proportionate sizes are "drilled."

Proper consideration of the variables is important. If the flood is linear along the length of the model and gravity effects are negligible, varying the height has no significance. Any length serves as a model provided other quantities are scaled as required by the factors to be studied.

If rates or times are included in the results desired, then the pressure drop is among the quantities to be scaled. This was not scaled in the flooding example given, where water-oil ratios but not amounts of water or oil were of prime interest. However, one cannot offhand be sure that a certain quantity can be ignored when lengths are changed.

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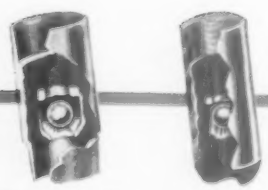

Fig. 401 (M&F)

Fig. 302

At left are shown the Larkin Regular Float Shoe (Fig. 302) and the Larkin M&F Float Collar (Fig. 401 M&F).

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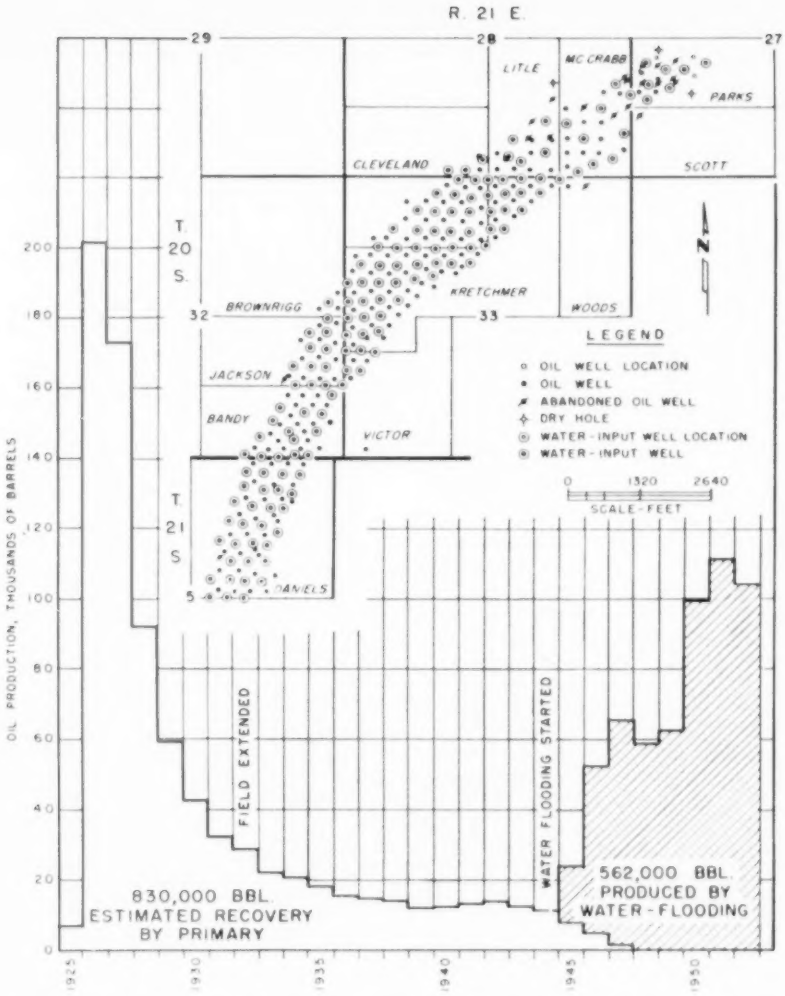


Fig. 1—Production history and map of Kewanee Oil Co. Dengo project, Anderson County, Kansas, as of January 1, 1953.

Kewanee's Dengo

Water-Flood Project May Yield 3,000 Bbl. Per Acre

. . . from an 18-ft. sand at 650-ft. depth

by J. P. Powell* and J. L. Eakin*

OVER 562,000 bbl. of oil has been produced by injecting 2,848,000 bbl. of water at the Dengo flood of Kewanee Oil Co. A restricted method of production, quite different from the usual practice, has been employed in this Anderson County, Kansas, field.

Soon after startup, when monthly oil production rate of 5,000 bbl. was reached, production was held constant for over 4 years by closing in each producing well daily. During the next 6 months, rate was increased to about 8,500 bbl. monthly and maintained at that rate for nearly 3 years by building up formation pressures. During increase in production rate, water injection was increased to keep oil wellhead pressure constant.

Advantages of this method include possibility of greater ultimate oil recovery and stabilizing of income over period of several years.

Kewanee's Dengo flood on the eastern end of the Bush City shoestring field, in Sections 27, 28, 32, 33-20s-21e, and 4-21s-21e, Anderson County, Kansas, was begun in September 1944. The Squirrel sand, at a depth of 650 ft. and with an average thickness of approximately 18 ft., is flooded.

History Before Flooding

Original development of the flooded leases was begun in 1925 and substantially completed in 1926, when the annual rate of oil production reached a peak of more than 201,000 bbl. Fig. 1 shows a composite production history and a map of all leases included in the project.

The rapid decline of oil production during first few years after the peak rate was attained during primary operations is typical of reservoirs in the Squirrel sand in the shoestring fields of eastern Kansas.

A limited amount of air was injected into several wells on these leases between 1944 and 1948. It is estimated that 16,500 bbl. of oil was gained from the air drive and that recovery by air injection and primary operations, hereafter combined in one figure, amounted to more than 830,000 bbl. of oil, or about 2,400 bbl. per acre.

Completing and Operating Wells

Input wells on the Dengo flood were completed with 2-in. tubing and rag packers cemented at the top of the oil sand, each with 15 sacks of cement. All of the input wells were newly drilled and were cored and shot with 1½ qt. of nitroglycerin per foot of oil sand.

Most of the oil-producing wells were completed for operation as flowing wells, but some on the outside edges of the productive sand were pumped. Some of the oil-producing wells that fell into the pattern were used on the flood. These wells were cleaned out, reshot with a light charge of nitroglycerin, and completed with 2-in. cement-lined tubing and rag packers set and cemented at the top of the oil sand.

The new producing wells were completed in the same manner as the input wells, except that 2-in. cement-lined tubing was used. The pumping wells were completed with casing cemented at top of the oil sand and the wells were conventionally equipped with rods, tubing, and pumping units.

*Petroleum engineers, U. S. Bureau of Mines, Petroleum Experiment Station, Bartlesville, Okla.; data from U.S.B.M. R.I. 4991.

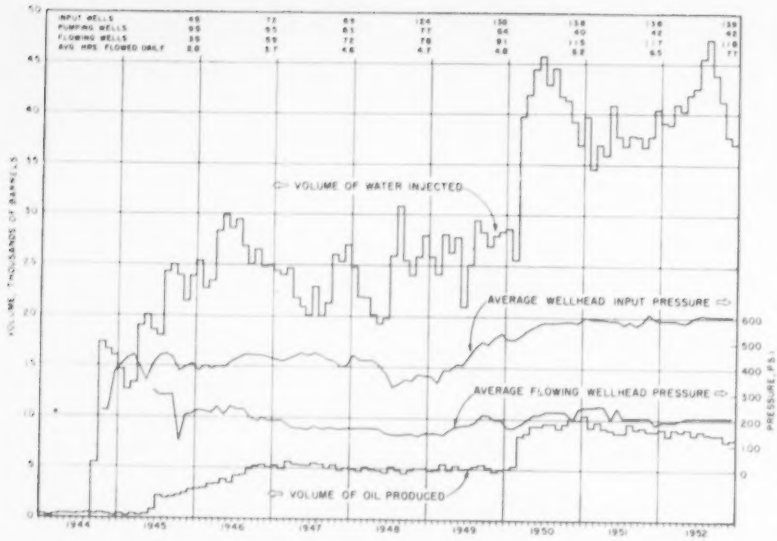


Fig. 2—Production history and flow data of Kewanee Oil Co. Dengo project.

Water was injected into the input wells without producing the surrounding oil wells for about 9½ months before the reservoir pressure was high enough to cause the oil wells to flow.

Oil was produced by flowing the wells intermittently for a definite period each day. The daily average flowing period was progressively increased from 2.8 hours in 1945 to 7.7 hours in 1952.

The monthly average well-head pressures for both input and producing wells are shown in Fig. 2 as well as the volumes of oil produced and water injected each month. The number of input, pumping, and flowing wells, and the average number of hours that the wells were flowed daily are tabulated at the top of the figure.

The method of operating this project is quite different from the usual practice. After the project reached a monthly rate of 5,000 bbl. of oil, the rate of oil production was held fairly constant for over 4 years by closing in each producing well daily. During the next 6 months the rate was increased to about 8,500 bbl. of oil monthly, and it was maintained at that rate for nearly 3 years by gradually building up the formation pressures as a result of increased water-input rates. At the time the oil-production rate was increased the rate of water injection also was increased sharply so that the well-head pressure on the oil wells remained fairly constant (see Fig. 2).

Source and Treatment of Water

A well drilled into the Mississippi limestone formation to 1,551 ft. is the source of water for flooding. This well was completed with 7-in. casing set at the top of the limestone and cemented to ground level. It was equipped with a Lamtex casing pump set at 660 ft. and a large pumping unit powered by 30-hp. electric motor. The motor is controlled by a float in the settling pond to insure an adequate supply of water for optimum operating conditions.

The pump forces 600 to 800 bbl. of water daily from the well to a cascade-type aerator through which the water falls into a settling pond (capacity approximately 18,000 bbl.) where the supply water mixes with produced brine from the gun barrels.

Water flows from the settling pond into a 500-bbl. Accelator tank where chemicals are added. From the time injection was begun to May 1951, lime and alum were used for treating. In that month the use of Pur-O-San was introduced and has been continued since. Approximately 3 qt. of the treating compound is used daily.

Water is pumped from the Accelator through an 8 by 8-ft. filter, using crushed coal as a filter medium, and thence into a 500-bbl. clear-water tank. The pressure filter is backwashed 3 to 5 minutes twice a day.

A 3¼-in. by 7-in. triplex pump equipped with porcelain plungers and driven by a 40-hp. motor pumps the water into the distribution system at a plant pressure of 620 psi. Rates of injection are controlled at each input well.

Results of Water Flooding

The water-flooding results on Kewanee's Dengo project have been very good. Over 562,000 bbl. of oil was produced by injecting 2,848,000 bbl. of water. This is only about 5 bbl. of water injected for each barrel of oil produced.

It appears that the restricted method of production used has several advantages. In addition to offering a possibility of greater ultimate recovery as a result of the higher pressures used and the possibility of less channeling, the operating method provides a stable income over a period of several years and requires a smaller water-conditioning plant.

Although a decline in the rate of oil production has not yet been defined, it is estimated that an additional 500,000 bbl. of oil will be produced on the project. The 562,000 bbl. of oil produced to January 1, 1953, by water flooding amounts to 1,624 bbl. per acre. The recovery by flooding is expected to exceed 3,000 bbl. per acre, as compared to 2,399 bbl. per acre produced by primary production methods.

SUMMARY OF OPERATIONS
(Kewanee Oil Co. Dengo project)

Sand flooded	Squirrel
Top of sand, ft.	650
Sand thickness, ft.	18
Productive area, acres	346
Area flooded	346
Well pattern—five-spot, ft.	(330-330 440-440)
Kind of water	Brine
Type of system	Open
First injection	Sept. 1944
First increase	June 1945
Status	Active
Gravity, °A.P.I.	37
Viscosity, cp. at 60° F.	5.8
Primary production, bbl.	830,225
Primary production per acre (346 acres), bbl.	2,399
Production by water flooding to January 1, 1953, bbl.	562,063
Production per acre by water flooding to January 1, 1953, bbl.	1,624
Cumulative production to January 1, 1953, bbl.	1,392,288
Cumulative water injected to January 1, 1953, bbl.	2,847,931

SUMMARY OF WATER-FLOOD PERFORMANCE

Date—	Acres flooded	Input wells	Oil wells	Cum. oil prod. (bbl. per acre)	Cum. water-inj. oil-produced ratio
January 1, 1945	60	17	130	0	
January 1, 1946	106	45	130	150	15
January 1, 1947	170	72	154	372	9
January 1, 1948	215	89	155	592	7
January 1, 1949	305	124	155	608	6
January 1, 1950	341	138	155	726	6
January 1, 1951	341	138	155	1,017	5
January 1, 1952	346	138	159	1,324	5
January 1, 1953	346	139	160	1,624	5

Watch That Arc!

. . . it's a hazard in cathodic-protection cables

by Marshall E. Parker*

IT has long been recognized that a certain hazard exists when a pipe line under cathodic protection is cut, or when a joint is broken in such a line. There may be a current, ranging upward to perhaps 50 amp., flowing in the line, and when the connection is broken, an arc will pass which is capable of igniting the inflammable vapors which are almost sure to be present.

In fact, the hazard exists even on lines which are not under cathodic protection; "long line" currents, associated with large dimension corrosion cells, may be present in sufficient magnitude to cause an arc. The recognition of this hazard has led to the general adoption of a rule requiring the installation of a temporary bond across any joint to be broken, the bond being so arranged that it can be opened at a location free from dangerous vapors.

Arcing conditions . . . It has also been recognized that such a hazard is virtually nonexistent in complex piping networks, such as are found in refineries and large tank farms. This is true because of the multiple paths to which the current has access. If only two parallel lines are carrying a current of, say, 60 amp., and one of them is opened, the low resistance of the alternate path afforded by the other line is such that there is no discernible arc.

Where there are many lines the hazard is even smaller. This effect can readily be demonstrated with the apparatus shown in Fig. 1. Three single-pole, single-throw switches are connected as shown, and the whole arranged to be connected across a 6-volt automobile storage battery, using about 15 ft. of No. 18 wire for leads (connections should be made quickly, for these leads will heat up rapidly.)

This arrangement will draw about 50 amp., and it can quickly be seen that opening switch A will draw a very considerable arc, whereas opening either B or C will result in almost no arc at all.

Some concern has been expressed about the hazard involved in the accidental cutting of a cable connecting a rectifier with either the protected piping or with the anode bed, in an area which may concern inflammable vapors. This accidental severing would normally interrupt the entire current output of the unit, and thus could cause an arc of sufficient magnitude to be really dangerous.

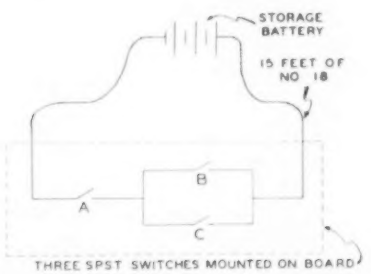
In the attempt to avert this hazard, various steps have been taken to protect the cable. Some operators require that cables be covered with a layer of red concrete before the trench is backfilled. Others make every effort to keep as much as possible of the cable aboveground, where it is protected from the danger of inadvertent ditching, but is possibly even more exposed to certain breakage hazards. The method suggested here is designed to combat all kinds of accidental breaking or cutting hazards, and is equally applicable to buried or suspended cables.

Two leads . . . It is proposed that **two** separate leads, at least, should be carried from the rectifier to the protected piping, and that at least **two** should be carried to each group of anodes served. In each case, the two from the same rectifier terminal should leave the unit going in opposite directions, so that there will be at all points a good separation between them. The two cables which go to the cathode may be attached to any conveniently located points on the piping network.

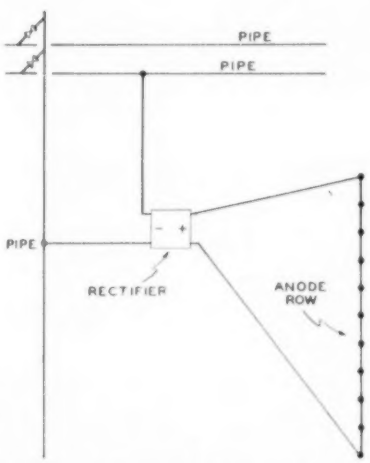
The two which go to the anode should be connected to each end of a

(Continued on page 119)

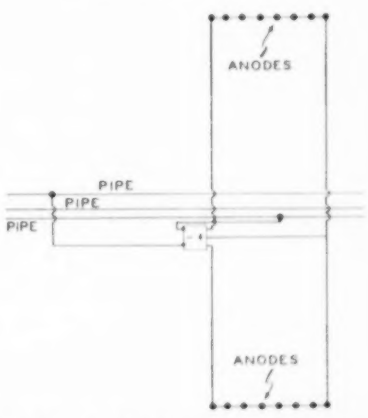
*Consultant, Houston.



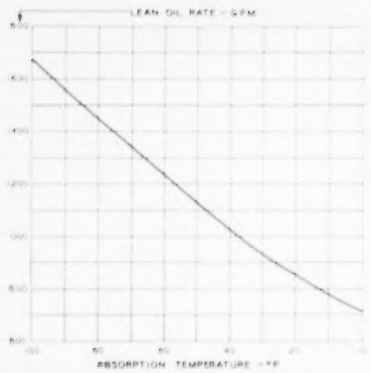
DEMONSTRATION OF MULTIPLE PATH FEEDERS. With all three of the switches closed, the connection to the battery is made, then opening switch A will produce an appreciable arc, whereas opening either B or C will produce no arc at all. Note—the 15 ft. of No. 18 wire will limit the current from the battery to about 5 amp.; however, this will heat the wire rapidly, so the current should not be permitted to flow for more than a second or two during demonstrations. Fig. 1.



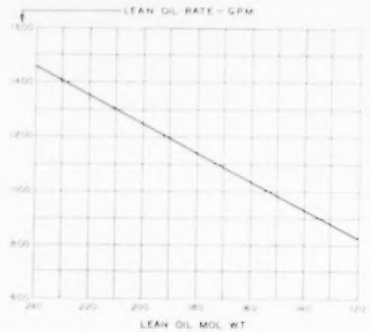
MULTIPLE FEEDER RECTIFIER CONNECTION. Note that there is no point outside the rectifier where breaking or cutting a cable will interrupt the current output of the unit; such an arrangement, then, is safe from the arc hazard of an accidentally cut cable. Fig. 2.



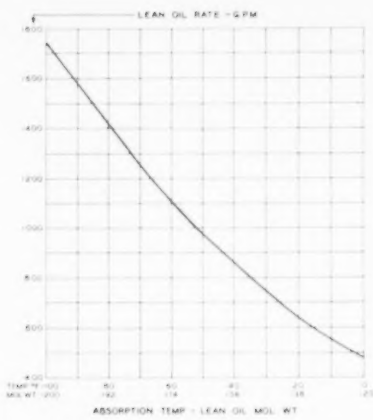
MULTIPLE FEEDERS FOR MULTIPLE ANODE GROUPS. This illustrates the application of the multiple feeder principle to a rectifier supplying two separate anode groups. Without the cable connecting the outer ends of the two rows, a sizable portion of the current would be interrupted upon cutting either of the anode feeders. Also note the connection of the two cathode leads to different pipes, so that there is no point at which a cut pipe would interrupt a large part of the current. Fig. 3.



LEAN-OIL RATE as function of absorption temperature for recovery of ethane from natural gas. Fig. 1.



LEAN-OIL RATE as function of lean-oil molecular weight for recovery of ethane from natural gas. Fig. 2.



LEAN-OIL RATE as function of temperature-molecular weight factor, for recovery of ethane from natural gas. Fig. 3.

Operating the gasoline plant for

High Ethane and Propane Recovery

Petrochemical usage of ethane points the way for additional recovery of this chemical; however price must be less than 4 cents per gallon to be competitive with coal.

by T. D. Tabbert*

THE constantly increasing demands of the chemical manufacturers for ethane, combined with a relatively stable propane market, have made the natural-gasoline industry seriously consider the problem of high recovery of these two products. It has opened a new approach to the entire process-design problem, for the inefficiencies that could be tolerated in low-recovery units would prevent the recovery of ethane as a product due to its low market price.

The market for ethane is the chemical manufacturer. Its price must be lower than propane or coal or the manufacturer cannot afford to use it as a raw material for ethylene production. Since 1 gal. of ethane yields 1.7 lb. of ethylene and 1 gal. of propane yields 2.2 lb. of ethylene plus additional byproducts, the ratio of 3 cents per gallon for ethane to 4 cents per gallon for propane is logical. Some of the eastern chemical concerns would indicate that at 4-cent per gallon price for ethane a gradual conversion to the use of coal as a raw material would be attempted.

It is essential that the natural-gasoline industry, with the largest potential source of ethane, develop process systems to recover ethane in conjunction with high-propane-recovery plants with a minimum of additional fuel expense as well as capital investment. With the ethane price fairly well fixed with the present economic conditions, it must be regarded as a by-product that would otherwise be wasted in any high-propane-recovery unit.

Fortunately ethane is usually present in a much higher percentage in any natural gas than any other recoverable product. Therefore recovery of only 20 per cent of the ethane in conjunction with a 60 per cent propane-recovery unit can result in large increase in the over-all plant income.

As the chemical market for ethane is ideal in the Gulf Coast region, more and more consideration will be given to ethane recovery in every new plant that is built in this area. It is possible that existing plants can be revamped to recover the ethane presently sold or used as fuel, but the problem is difficult. Practically every high-propane-recovery plant design depends on an efficient system to vent the ethane from the oil. The rich vapor streams can be gathered and the ethane concentrated in this manner, but to recover a pure ethane product stream is a major addition.

Plant trend . . . The trend in ethane recovery plants can be seen in the two major pipe-line stripping-plant projects to date. One plant in operation recovers 17 per cent ethane by straight refrigeration to approximately minus 100° F. The other plant employs a two-stage absorption process, consisting of low-molecular-weight main absorption oil and high-molecular-weight oil such as kerosine to recover retrograde losses, to extract approximately 35 per cent ethane at — 20° F.

In both cases the volume of gas is much greater than would normally be encountered in a field plant and in both cases the price of gas for fuel purposes is extremely high. To one who is unfamiliar with high-ethane-recovery problems, these are both unusual flows, but the astronomical oil rates that would be encountered with a normal plant design would make the projects uneconomical.

Most of the high propane and ethane-recovery-plant studies have been directed along the lines of low-molecular-weight oil and refrigeration. To understand the relationship of recovery versus oil temperature and oil molecular weight, a series of absorption curves have been prepared. These curves furnish the background knowl-

*Chief process engineer, Fish Engineering Corp. Paper presented at eighth annual short course in gas technology, Texas College of Arts & Industries, Kingsville, May 27-29, 1953.

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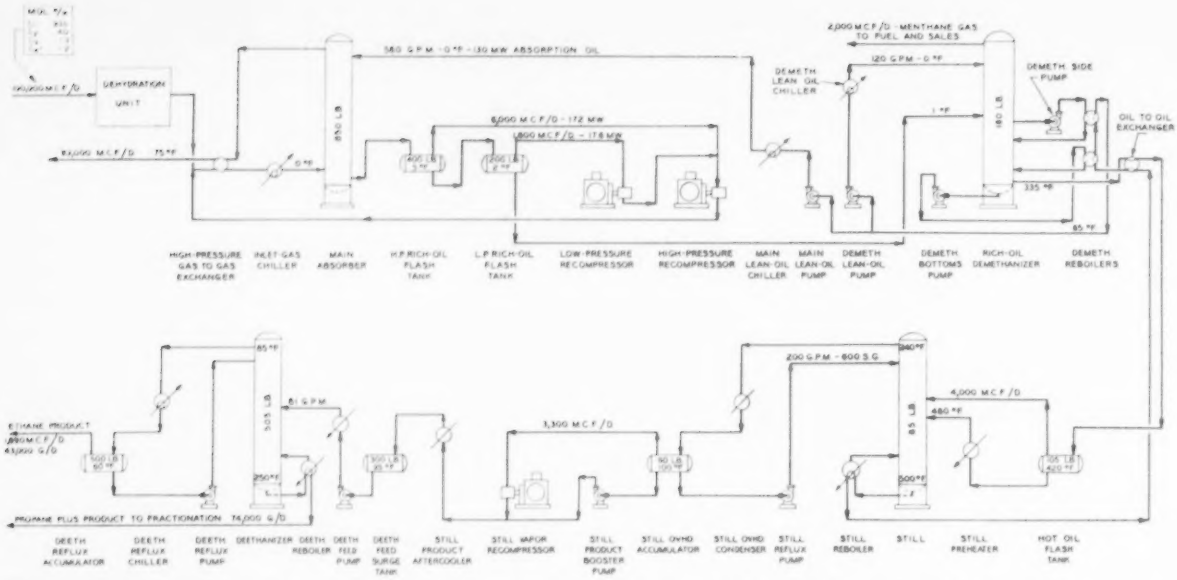

HIGH ETHANE RECOVERY is provided for in the unit portrayed by this diagrammatic sketch. Patents are applied for on this process. Fig. 4.

edge for the basic approach to a low-molecular-weight oil and refrigeration-type process cycle.

The absorption of components from natural gas by oil depends on gas analysis, temperature, pressure, oil characteristics, number of trays, and efficiency. By maintaining all of the factors constant which are normally fixed in any plant design, a series of curves can be calculated which consider temperature and oil characteristics as the only variables to be analyzed.

As a basis for these absorption curves, a typical Gulf Coast distillate gas analysis has been employed as follows:

Component	Mole Per cent
Methane	93.5
Ethane	4.0
Propane	1.3
Butanes +	1.2
	100.0

Absorption temperature . . . The first curve, Fig. 1, shows a plot of the absorption temperature versus the lean oil rate for a 100,000 M.c.f. per day plant to extract 50 per cent of the ethane from the above gas. At this percentage ethane recovery, a propane recovery of 98 per cent is obtained for an assumed 30 per cent tray efficiency for 24 actual trays. In each calculation a constant absorption pressure of 1,000 psi. and a fairly conventional 200-mole. wt.-40° A.P.I. lean oil were employed to eliminate the other variables from this curve. This curve illustrates the direct change in oil-circulation requirements in comparison to absorption temperature. A conventional 95° F. plant would require 1,620 g.p.m., at 65° F. — 1,300 g.p.m.; while at 15° F, the oil rate would be 810 g.p.m., or one-half the original 95° F. requirement.

However, this correlation does not consider the second important variable in any absorber calculation, oil molecular weight. Due to retrograde action at atmospheric temperature, high-pressure distillate plants have long been accustomed to the use of high-molecular-weight oils for absorption. The use of refrigeration eliminates this problem.

In Fig. 2, a plot has been made to show lean-oil molecular weight versus lean-oil circulation at a constant temperature of 60° F. The variables in absorption that were fixed on the previous curve remain the same; that is, gas analysis 1,000 psi. operating pressure, and 50 per cent ethane extraction at 100,000 M.c.f. per day gas rate. It was necessary to assume no retrograde loss at 60° F. regardless of the mocular weight of the oil in preparing this curve.

Fig. 2 illustrates the direct change in lean-oil rate by varying the molecular weight of the absorption oil. A standard 200-mol. wt. oil requires a 1,250-g.p.m. circulation rate while for example a 130-mol. wt. oil requires 850 g.p.m. or less than 70 per cent on the basis of molecular weight alone. The major reduction in lean-oil rate is due to the fact that a 130-mol. wt. naphtha contains more moles per gallon than the heavier oil. However, some increase in absorption tendency is to be noted in lighter oils due to the changing K values of a methane-naphtha system versus say a methane-kerosine system.

Combined effects . . . To combine these two effects, lower absorption temperature, Fig. 1, and lower lean-oil molecular weight, Fig. 2, a theoretical curve has been prepared, Fig. 3, which plots lean-oil circulation versus a temperature-lean oil molecular weight factor where little retrograde loss is to be expected. Plants are operating at various temperatures with lower-molecular-weight oil than those shown on this curve but for preliminary analysis a somewhat conservative approach can be assumed and still show the major trend. Here for example a 90° absorption with 201-mol. wt. oil requiring 1,575 g.p.m. can be compared to a 0° absorption with 120-mol.-wt. oil, requiring 470 g.p.m., or 30 per cent.

This may not seem impressive until a plant application is considered. A plant processing a major pipe-line company gas load of 500,000 M.c.f. per day would require 2,350 g.p.m. of oil at 0° F. or 7,875 g.p.m. of oil at 90° F. The fuel consumption for the low-temperature light-oil plant will be about 1 per cent of the throughput, while the heavy-oil plant will be near 3 per cent.

Consider then a difference of 2 per cent of the 500,000-M.c.f. per day throughput in fuel savings at 30-cent pipe-line gas. The 10,000 M.c.f. per day amounts to a savings of over a million dollars a year. This, then, is why lighter oil plants, lower temperature, two-stage oil absorption, and even direct refrigeration of the entire gas stream can be considered in this age of ethane recovery. The development of large transmission-line plants will be few and far between but the development of field plants to recover

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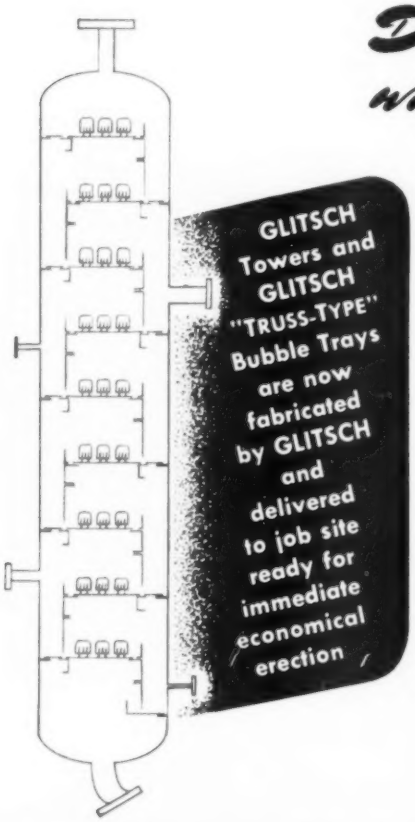

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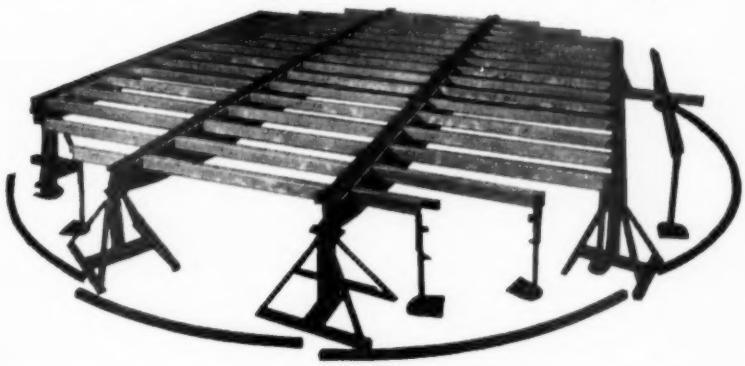

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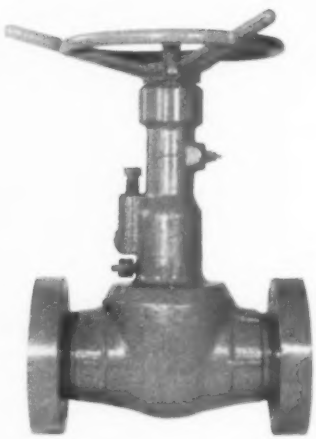

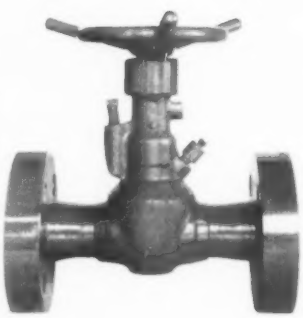

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ethane is something for every relatively large gasoline plant to consider, especially in the Gulf Coast locality.

The two types of plant expansion can be analyzed by means of Fig. 3, first from a theoretical standpoint to show the flexibility and then to compare the problem to two actual expansions we have undertaken. An initial plant gas volume of 100,000 M.c.f. per day, operating at 50° F., requires 970 g.p.m. of lean oil or approximately 14 gal. of oil per 1,000 ft. of gas. A plant gas-volume increase to 175,000 M.c.f. per day with the same percentage recovery is planned. This can be accomplished by the lowering of the temperature of absorption to 10° F., where again 970 g.p.m. of oil is required but with an oil to gas ratio of only 8 gal. per M.c.f.

This type of expansion to handle increased gas volume at the same recovery has been done in a Louisiana plant initially recovering 80 per cent propane from 90,000 M.c.f. per day with an oil-to-gas rate of 11 gal. per M.c.f. at 60° F. A plant volume increase to 140,000 M.c.f. per day or 55 per cent was required. This necessitated lowering the oil to gas ratio to 7.1 gal. per M.c.f. which was accomplished by lowering the absorption temperature to 30° F. Plotting these points on Fig. 3 will result in a near parallel line within the narrow range considered for a lower-recovery plant.

Increased recovery . . . The alternate type plant expansion is designed to increase the recovery of an existing gas volume. It can be assumed within reasonable accuracy that Fig. 3 can be used for a 200,000-M.c.f. per day gas volume and 25 per cent ethane recovery. At a 50° F. absorption temperature, an oil rate of 970 g.p.m. is required, and an oil-to-gas ratio of only 7 gal. per M.c.f. results.

It is desired to increase the ethane extraction from 25 per cent to 50 per cent which approximately doubles the oil rate, but by lowering the absorption temperature to 0° F. required oil-to-gas ratio is 3.5 gal. per M.c.f. which allows the expansion to be carried out with the same oil circulation.

This type of expansion to increase the recovery from a constant gas volume was undertaken in a Texas plant, originally employing a heavy oil. The plant gas volume was 210,000 M.c.f. per day with a propane recovery of less than 30 per cent and was to be expanded to recover 60 per cent which approximately required twice the oil rate. By lowering the absorption temperature from 95° to 60° F. and entirely changing the characteristics of the absorption oil, this expansion was

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performed without changing the oil circulation.

When enlarging a plant to recover additional product or to handle a larger gas volume the expansion is relatively simple if no increase in the oil system is required. It is difficult to convert a heavy-oil plant to a high-recovery; it is a simple problem to lower the oil and gas temperature in a low-molecular-weight oil plant to handle additional gas volume or to obtain a higher recovery. The use of even lighter oil and lower temperatures using a secondary recovery system to recover retrograde losses, has not been considered. Thus the limit of the expansion of the existing plant oil system has not been reached.

These absorption curves should be of benefit to anyone considering a plant expansion, since at high pressure of 800 to 1,200 psi. a near parallel line can be drawn to fit any operating unit.

Refrigeration unit . . . A detailed process flow sheet of a low-molecular-weight oil refrigeration absorption unit is illustrated in Fig. 4. Basically this is a high-propane-recovery unit, but the flow is modified to retain a major percentage of the absorbed ethane. This flow can be employed for example with a 60 per cent propane plant recovering 20 per cent ethane, a 75 per cent propane plant recovering 25 per cent ethane, or as this plant is basically designed, to recover 95 per cent propane with approximately 40 per cent ethane recovery.

This design recovery is higher than will be normally planned, but it can be considered to be the ultimate recovery feasible in a field plant. To change the design to 60 per cent propane or 80 per cent propane would make only minor changes in the plant flow, as only the absorption temperature and oil weight would be varied appreciably. The flow also shows the basic principle of recovering ethane as a product regardless of the propane recovery, as long as propane recovery is in the range of 50 per cent and greater.

With the price of ethane presently existing no more than incidental ethane recovery need be considered and the plant design is based on this premise.

The absorption temperature is set at 0° F., which necessitates both dry oil and gas to prevent hydrate formation. Various systems have been employed, such as circulating calcium chloride or glycol with the oil to prevent freezing problems, since it was very difficult to obtain dry oil in any of the older plants. In this cycle, no steam comes in contact with the lean oil; so that by dehydrating the inlet gas in a dry-desiccant system no water is present in the high-pressure absorber.

No unusual precautions need be taken in the design of the dehydration unit, though some conservative rating of the unit is recommended. Definitely reversal of the heating and cooling cycles in regenerating the beds is essential. An interesting fact of the reversal of the high-pressure dehydration ahead of the absorption is the elimination of corrosion problems. This actually was one of the major difficulties that led to the original light-oil and refrigeration pilot-plant studies.

Both the gas and oil are chilled to 0° F. The refrigeration load is minimized by the use of relatively efficient exchange of gas entering and leaving the absorber which is the largest single chilling load in the plant. Due to the nature of the distillation equipment the oil chilling load from 65° to 0° F. is a wide range, but any other system of exchange increases the chilling demand or oil rate elsewhere in the plant, complicating the recovery problem. Concentrating the low-temperature duties in large units greatly simplifies the refrigeration piping system. Propane refrigeration has been considered ideal for this type plant since a temperature of −30° F., can be obtained and the product is always available for makeup requirements.

The rich oil from the bottom of the absorber contains an unusually high percentage of absorbed constituents; though the actual quantity of methane absorbed will be somewhat less than that recovered with a heavy oil for the same percentage ethane extraction. This rich oil, containing methane as the only undesirable constituent, can be flashed in two stages with the resulting vapors being returned through the absorber for reabsorption and sales.

A highly selective flash is obtained at low temperature so that the vapors released from the successive pressure drops are unusually lean, even in ethane content. A very small recycle load occurs and unless ethane recovery were being considered, these vapors could be theoretically bypassed to the residue sales directly.

In the original rich oil leaving the absorber, approximately six times the methane quantity is present to ethane. After two flashing stages the ratio is reduced to just over two times the methane to ethane quantity present in the oil. Plants having a larger oil rate than this typical example can well consider three and even four pressure flashes with the higher selectivity and horsepower savings that are possible. This is an important feature in the use of refrigeration; the selectivity of the equilibrium flashes greatly reduces the secondary-recovery system.

Ethane recovery . . . The success of the ethane recovery system depends on an efficient system of final demethanization. Using what can be considered a naphtha cut for lean oil allows direct reboiling of the rich oil at a relatively low temperature. In most respects this column behaves as any fractionating column, with the exception that absorption oil is used for reflux. The column shown in Fig. 4 is a modification of usage of systems that have been widely employed in the industry, such as demethanizing absorbers, rich-oil deethanizers, etc.

While the tower is designed to make a relatively sharp separation between methane and ethane to permit production of 95 to 97 per cent pure ethane, such purity of product may not be necessary for actual sale. Substantially complete removal of methane does simplify the balance of the plant and actually costs very little additional equipment investment.

Operating at a relatively low pressure, 160 psi., the rich-oil demethanizer reboiler temperature of 335° F. allows all of the heat to be supplied by direct exchange with the returning lean oil. Due to the low temperature of reboiling, the variation between the methane and ethane K values is still high and few theoretical trays are required for stripping. It is not the most efficient method of recovering refrigeration, as was pointed out earlier, but by the use of side reboiling, reasonably close approach between lean and rich oil can be obtained.

The demethanized rich oil is pressured to the still for separation of the recoverable products from the absorption oil. The still in this case is actually a fractionator, controlling the end point of the overhead product and the initial of the oil by direct reboiling. It is essential to keep the still pressure low enough to reach the vaporizing temperature of the lean oil well below its critical temperature. It is also necessary to keep the pressure high enough for some substantial percentage condensation of the overhead to be obtained.

At some point between these overlapping restrictions, the optimum design pressure can be determined. For the column shown, an 85-psi. operating pressure was employed which allowed 20 per cent condensation of the overhead with a reboiler temperature of 500° F.

The 500° F. oil is exchanged with the bottoms from the rich-oil demethanizer and provides flexibility to the demethanizer reboiler temperature. The increase in temperature and decrease in pressure of the demethanized oil produces a high percentage of flash vapors which are passed directly to the rectifying section of the still.

In this manner the oil to the still can be preheated to a temperature closely approaching the reboiler temperature without excessive flashing of the light oil. The reboiler then serves the purpose of providing stripping vapors rather than adding the tremendous quantity of specific heat required to raise the rich-oil temperature. Since the still-bottom size is directly proportional to the reboiler vapor quantity, this is an important design feature.

Partial condensation of the vapor overhead is obtained at a water-cooling temperature of 95° F. All of the overhead is desirable product and the noncondensed vapors are recompressed and combined with the condensed liquid to a pressure high enough to cause complete condensation at atmospheric temperature, in this case 300 psi. This combined liquid product is the feed to the light-ends fractionation unit and a liquid feed is to be preferred for horsepower savings, as well as more uniform control of the feed rate.

Such a raw product can be transported as a single plant product, though the usual field plant includes a fractionation unit containing facilities to make specification propane, butane, and motor fuel or natural gasoline.

Deethanizer . . . The deethanizer, which is all of the fractionation plant shown on the flow sheet, now produces a relatively pure ethane overhead product and represents in gallons over one-third of the total recovery. High level refrigeration is employed for the reflux condenser to obtain ethane condensation at approximately 60° F. and 500 psig. In this manner 95 to 97 per cent pure ethane is available as an individual stream ready for sale or, if no sale exists, to be returned to high-pressure-gas sales. The important point is to realize the slight additional investment to recover ethane as a pure product when undertaking a high propane recovery project.

Market considerations . . . For the years to come ethane must be regarded as a byproduct to the natural-gasoline industry. The price of ethane at 50 or 75 cents per M.c.f. is in line with the present market trend. Analyze this fact then, that at 15 cents per M.c.f. for 1,000 B.t.u. gas ethane can be used as plant fuel and be worth the ratio of its heating value or 25 cents per M.c.f. If the expansion to recover ethane complicates the plant both in added fuel and operating expense, the marginal profit is mighty slim. The plant illustrated can accomplish this by requiring no additional operating personnel and actually consuming substantially less fuel than is normally used in any high-molecular-weight oil plant.

The remainder of the light-end fractionation unit has not been shown, since depropanization and debutanization are typical. Some consideration must be made of the system of maintaining the desired molecular-weight lean oil which is one of the most important factors to smooth operation. Definitely, the ability to produce the specification oil becomes a part of the initial plant design. With the volume of heavy ends present in distillate, providing a distillate fractionation system that is flexible in range of end point products allows the production of a wide range of absorption oils.

The still in the plant controls the initial boiling point of the oil and some method of limiting the end point is all that is required. For example, a 400° end-point naphtha can be blended into the main oil stream and the initial controlled at 325° F. and a 145-mol. wt. oil will result. By reducing the end point of the naphtha to 350° and the initial of the oil to 275°, a 130-mol. wt. oil can be produced.

In the design of the distillate system this requires one more side-cut fraction than is normally employed. It is customary in the final columns to produce a 300° to 400° F. range naphtha, a 400° to 500° F. range kerosine, and a residue fraction or several, depending on the nature of the distillate. If provision for one more side cut is made in the division of the 300° to 400° F. range naphtha, a wide range of absorption oil can be produced.

Ultimately the slight amount of heavy ends present in the gas can be used for the lowest-molecular-weight oil possible economically.

Utilities . . . The general type of utilities for this type of flow can be carried to meet different field conditions and plant sizes. Since no process steam is required, a wide variety of selections can be made on the basis of the individual unit's efficiency, investment cost, and operating and maintenance considerations. This particular plant has been set up on the basis of a direct-fired heating medium furnace to supply all of the necessary heat by means of hot-oil circulation to the three basic process-load requirements shown.

By concentrating all of the heating requirements in a single unit, a higher efficiency can be obtained at a lower investment cost. Similarly all of the horsepower for driving the recompressors, the propane refrigeration, and electric generators is of the heavy-duty gas-engine type. Every pump in the plant is electric driven which has some advantage in this size plant from an operating standpoint.

In large plants where good water is available, the use of stream for electric-generator drives, major pumping requirements, low-temperature heating, as well as the major requirement for driving the centrifugal refrigeration compressors can be recommended. Detailed studies indicate not only a lower initial investment with equal fuel efficiency, but a lower operating and maintenance cost. This requires high-pressure boilers in the 600-psi. pressure range with operating efficiencies of over 80 per cent.

The use of steam becomes more and more attractive as the plant size increases. This particular flow might be considered a borderline case because some direct-fired heating is required due to the 500° F. temperature level. By redesigning this plant to a lower-temperature level of oil reboiling, it is possible to operate completely with steam for heating and power, with the exception of the small recompressor loads. These require reciprocating machines even in the pipe-line size plant due to the small volume of gas handled.

Investment . . . Additional investment to recover this ethane byproduct stream as a salable product can be analyzed by noting the cost difference between a unit that vents the ethane from the oil ahead of the still, and the unit, where the separate ethane product is recovered.

The actual difference in design amounts to a relatively small investment provided an ethane market is available or can be made available.

For simplification two basic process changes can be made and the plant can be converted from ethane recovery to high propane recovery only. The rich-oil demethanizer can be enlarged to operate as a rich-oil deethanizer, whereby the ethane is removed as part of the overhead vapor stream. In this manner the still operation can be changed from partially condensing to totally condensing.

All of the equipment beyond the still overhead accumulator, i.e., the still-vapors recompressor and the deethanizer, can be salvaged. By renaming the rich-oil demethanizer and changing its operating conditions, a typical example of a present-day high-propane-recovery plant can be seen.

To approximate the savings of removing the ethane-recovery portion of the plant, a 280-b.hp. compressor installation and a complete 42-in. deethanizer installation are no longer required. To this ethane-recovery equipment, a value of $200,000 can be assigned.

Ethane cost . . . It is more difficult to show the added cost of removing the ethane in a rich-oil deethanizer—totally

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condensing still cycle. Rapidly considering the major changes, they are as follows:

1. The still pressure will be increased to 115 psi. and the reboiler temperature to 560°.

2. The rich-oil deethanizer will operate at a lower pressure or a higher reboiler temperature.

3. Compression horsepower will be required to compress the ethane from the lower pressure to the 500 psi. in the original flow.

While additional exchanger surface, heater requirements, and vessel areas will be required these are all incremental cost increases. To remove the ethane product ahead of the still an added investment cost of $50,000 can be assigned.

By comparison it has cost approximately $150,000 to recover the pure ethane stream with little or no change in operating or fuel expenses. At a net price of 1 cent per gallon for the ethane the yearly return for the 43,000 gal. per day would be $157,000 or at a net price of 1½ cents per gallon the return would be $235,000. In either case a rapid payout for ethane recovery is indicated, provided the market is available.

Probably a more important comparison is the low temperature-low molecular weight oil process to any heavy oil process that might be conceivable for an ethane recovery such as this. It is difficult, if not impossible, to compare the additive costs in a high-molecular-weight oil plant since the same flow cannot be employed to recover ethane in this percentage range. Oil rate will be at least tripled in the heavy-oil plant. Oil rate in general fixes the size of the exchangers, coolers, still sizes, stripping-steam rates, reflux condenser loads, and to a large extent the utility load of the entire plant. Needless to say the larger the oil rate the more impressive the savings become.

While it is very definitely established that the process employing low-molecular-weight oil and low temperatures will lead to a substantial fuel savings and in larger units to considerable investment savings, the conclusion that every plant will be employing such a cycle should not be implied.

When the propane recovery desired approaches 60 per cent and greater and the gas volume to be processed is relatively large, the unit for propane recovery alone is highly competitive from an investment standpoint. Should the incidental ethane extracted also be desired as a pure product stream, the advantages of the low temperature-low molecular weight cycles are sufficient to justify installations that could not be considered with any other process presently employed.

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Characteristics of West Texas Crude Oils

. . . as reported in U.S.B.M. Report of Investigations 4959

Field, county, producing formation and age*	Depth (ft.)	Properties of crude oil: Gravity, °A.P.I.	Color†	Sulfur (%)	Visc. at 100° F. (sec.)	Carbon residue (%)	Total gasoline and naphtha: (%)	°A.P.I.	Residuum: (%)	Gravity, °A.P.I.	Carbon residue (%)
Abell, Pecos:											
McKee sand, Simpson form., Ord.	5,353- 5,400	43.4	B.B.	0.21	39	1.6	35.2	66.1	19.9	19.4	7.1
Simpson dolomite, Simpson form., Ord.	4,740- 5,750	47.1	B.B.	0.34	40	1.6	30.4	63.7	21.2	19.4	6.6
Waddell sand, Simpson form., Ord.	5,945	40.0	B.B.	0.34	42	1.8	29.3	63.1	23.4	19.7	6.8
Ellenburger limestone, Ord.	5,755- 5,882	40.9	B.B.	0.33	42	1.7	30.9	62.9	21.3	19.4	6.8
Abell, Northwest, Pecos:											
McKee sand, Simpson form., Ord.	5,482- 5,535	41.3	G.B.	0.30	41	2.0	31.4	64.8	23.1	19.2	7.4
Adair, Terry:											
San Andres limestone, Perm.	4,866- 4,927	33.0	G.B.	2.04	44	3.1	31.9	56.2	26.4	12.2	10.2
Andector, Ector:											
Ellenburger limestone, Ord.	8,463- 8,513	43.2	B.G.	0.22	38	1.1	34.9	64.2	20.0	20.7	4.9
Anton-Irish, Hale:											
Clearfork limestone (dolomite), Perm.	5,498- 5,888	31.0	B.B.	2.14	46	4.9	32.0	57.2	28.5	9.4	15.0
Apco-Warner, Pecos:											
Ellenburger limestone, Ord.	4,730	34.2	B.G.	0.77	53	2.6	22.9	58.2	29.3	18.1	8.0
Barnhart, Reagan:											
Ellenburger limestone, Ord.	8,961- 9,082	41.7	N.P.A. 7	0.10	38	0.4	37.0	57.9	18.9	24.9	2.1
Bedford, Andrews:											
Devonian dolomite	8,757-11,416	40.6	G.B.	0.57	38	1.5	38.3	62.1	20.5	18.2	6.2
Ellenburger limestone, Ord.	11,018-11,333	43.2	G.B.	0.10	38	1.5	34.4	67.8	19.7	19.7	6.5
Benedum, Upton:											
Fusselman, Sil.	11,040-11,110	58.7	N.P.A. 1½	0.19	32	0.10	56.5	62.9	5.1	28.4	0.3
Ellenburger, Ord.		54.4	N.P.A. 2	0.10	33	0.10	56.6	65.6	6.3	29.1	0.4
Big Lake, Reagan:											
Permian limestone	4,200- 4,381	39.6	Green	0.14	39	1.1	36.9	58.2	22.3	20.8	4.2
Ellenburger limestone, Ord.	8,275- 8,301	44.7	N.P.A. 7	0.20	37	0.7	37.8	63.4	20.6	24.7	2.8
Ellenburger limestone, Ord.	8,824- 8,926	72.4	N.P.A. 1½	0.10	32	0.10	90.3	71.8	3.4	40.4	0.3
Block 31, Crane:											
Devonian dolomitic limestone	7,850-10,250	44.5	Green	0.18	35	0.7	43.3	61.8	15.2	21.6	3.9
Ellenburger limestone, Ord.	10,250-10,440	45.8	B.G.	0.14	36	0.9	36.1	66.7	16.8	21.6	4.6
Cedar Lake, Gaines:											
San Andres limestone, Perm.	4,580- 4,765	32.5	G.B.	2.12	45	3.3	31.8	56.2	27.0	11.9	10.7
Crossett, Crane:											
Devonian limestone	5,374	43.6	N.P.A. 8	0.10	36	0.5	41.4	60.0	17.3	23.0	2.8
Dollarhide, Andrews:											
Devonian limestone	7,778- 8,051	38.2	B.G.	0.57	41	1.8	35.8	61.3	24.7	17.3	6.4
Embar, Andrews:											
Ellenburger limestone, Ord.	7,740- 7,901	42.6	Green	0.24	37	0.6	40.2	61.3	18.4	22.5	2.9
Fullerton, Andrews:											
Devonian limestone	8,336- 8,547	41.5	B.G.	0.29	38	0.9	37.5	61.0	19.4	21.8	4.3
Ellenburger limestone, Ord.	9,880- 9,945	39.0	G.B.	0.47	43	2.9	30.6	66.4	25.4	15.1	9.8
Garza, Garza:											
Permian limestone	2,935- 3,032	36.4	G.B.	0.51	42	2.5	34.5	57.2	23.9	17.5	8.2
Goldsmith, Ector:											
Permian limestone	4,163- 4,179	33.6	B.B.	2.17	49	3.4	26.3	57.2	26.3	14.8	11.5
Jamison, Coke:											
Pennsylvanian limestone		46.9	N.P.A. 5	0.10	36	0.3	45.1	62.1	14.4	24.9	1.7
Jones Ranch, Gaines:											
Devonian limestone	11,181-11,422	43.8	B.G.	0.19	36	1.2	41.6	62.6	16.4	19.5	6.5
Kermit, Winkler:											
Ellenburger limestone, Ord.	10,460-10,705	41.9	N.P.A. 7	0.19	39	0.5	30.0	61.8	20.3	24.3	2.3
Keystone, Winkler:											
Devonian dolomitic limestone	8,040- 8,730	32.7	B.G.	0.69	68	1.9	18.6	57.7	34.5	20.3	5.2
Silurian limestone	8,230- 8,507	36.2	B.G.	0.99	49	2.3	31.7	60.2	30.1	17.6	6.7
Ellenburger limestone, Ord.	9,870-10,010	43.8	B.G.	0.18	36	0.6	32.6	63.1	17.3	23.3	2.9
Levelland, Hockley:											
Permian limestone	4,725- 4,835	32.7	G.B.	1.90	44	4.1	32.9	56.4	26.5	10.6	13.4
Mabee, Andrews:											
Permian limestone	4,654- 4,700	31.9	G.B.	2.19	47	4.2	30.0	58.4	29.3	11.0	12.5
Martin, Andrews:											
McKee sand, Simpson form., Ord.	8,700- 8,790	41.5	G.B.	0.16	40	2.9	32.5	66.1	23.5	17.0	10.7
Ellenburger limestone, Ord.	8,840- 8,880	43.0	G.B.	0.28	38	2.2	34.0	66.4	20.9	17.3	8.9
McKee, Crane:											
McKee sand, Simpson form., Ord.	6,078- 6,098	39.6	B.B.	0.22	44	2.4	26.3	61.8	24.8	19.7	8.6
Midland Farms, Andrews:											
Grayburg sand, Perm.	1,548- 1,722	31.7	G.B.	2.04	46	3.7	29.5	57.9	28.8	11.6	11.3
Monahans, Ward:											
Ellenburger limestone, Ord.	10,081-10,545	47.2	B.G.	0.16	37	0.8	37.7	67.0	15.9	22.0	4.4
Nelson, Andrews:											
Ellenburger limestone, Ord.	10,606	43.0	D.G.	0.15	38	1.9	32.9	67.0	20.0	17.1	8.1
Pegasus, Upton:											
Ellenburger limestone, Ord.	12,833-12,935	53.0	N.P.A. 4½	0.10	33	0.2	46.3	67.5	8.3	27.9	1.6
Penwell, Ector:											
Ellenburger limestone, Ord.	8,888- 9,020	41.7	D.G.	0.24	40	2.1	32.3	65.9	22.0	17.8	8.2
Polar, Kent:											
Ellenburger limestone, Ord.	7,793- 7,938	40.9	G.B.	0.43	38	2.0	35.1	62.3	20.7	17.6	8.4
Sand Hills Tubb, Crane:											
Permian limestone	4,137- 4,200	36.8	G.B.	0.92	42	2.5	33.6	59.5	25.0	16.8	7.6
Shafter Lake, Andrews:											
Devonian limestone	9,382- 9,888	38.6	G.B.	0.77	40	2.1	33.7	61.0	24.4	17.0	7.6
Ellenburger limestone, Ord.	11,713-11,768	41.3	G.B.	0.27	39	2.5	32.4	66.4	24.0	17.0	9.0

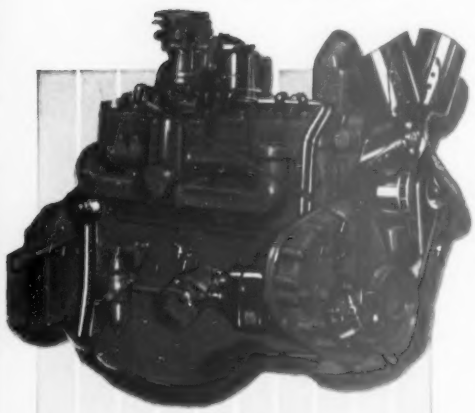
CANYON REEF TREND (SCURRY COUNTY AND ADJACENT PRODUCTION)

Field, county, producing formation and age*	Properties of crude oil: Depth (ft.)	Gravity, °A.P.I.	Color†	Sulfur (%)	Visc. at 100° F. (sec.)	Carbon residue (%)	Total gasoline and naphtha (%)	Total gasoline and naphtha °A.P.I.	Residuum (%)	Residuum Gravity, °A.P.I.	Residuum Carbon residue (%)
Clairemont, Kent:											
Strawn limestone, Penn.	6,737- 6,752	38.8	G.B.	0.50	39	2.2	35.8	60.8	23.2	17.1	8.4
Cogdell, Kent:											
Canyon Reef limestone, Penn.	6,857	41.7	G.B.	0.38	37	1.8	38.2	62.6	19.9	17.5	7.6
Canyon Reef limestone, Penn.	6,144- 6,878	39.8	G.B.	0.42	38	1.9	37.4	60.2	21.7	17.3	7.5
Fuller sand, Wolfcamp, Perm.	4,991- 5,020	42.3	B.G.	0.24	36	1.1	41.3	60.2	17.4	19.0	5.4
Dermott, Scurry:											
Ellenburger limestone, Ord.	8,200- 8,404	46.3	B.G.	0.17	35	1.3	46.5	64.8	14.5	18.2	7.6
Diamond M, Scurry:											
Canyon Reef limestone, Penn.	6,569- 6,617	45.4	B.G.	0.20	35	0.9	43.0	61.5	16.1	20.2	4.9
Early, Scurry:											
Strawn limestone, Penn.	7,520- 7,545	38.4	G.B.	0.37	40	2.0	32.9	59.5	21.5	17.3	8.1
Good, Borden:											
Canyon Reef limestone, Penn.	7,940- 8,010	43.6	B.G.	0.21	36	1.2	42.1	61.5	17.2	18.6	6.0
Kelly, Scurry:											
Canyon Reef limestone, Penn.	6,773- 6,778	42.1	B.G.	0.22	36	1.1	42.1	60.0	17.2	19.4	5.8
Canyon Reef limestone, Penn.	6,845- 6,888	41.9	B.G.	0.28	36	1.1	41.5	59.7	16.9	18.7	5.5
Canyon Reef limestone, Penn.	6,795- 6,875	39.4	Green	0.19	38	1.2	37.1	57.9	18.4	19.0	5.7
Reinecke, Borden:											
Reef limestone, Penn.	6,886- 6,920	44.5	Green	0.15	36	0.6	43.9	60.8	16.6	21.8	2.9
Salt Creek, Kent:											
Canyon Reef limestone, Penn.	6,214- 6,680	39.8	B.G.	0.54	39	2.4	35.0	60.8	23.4	16.5	8.9
Schattel, Scurry:											
Canyon Reef limestone, Penn.	6,816- 6,891	41.1	D.G.	0.40	37	1.4	40.4	60.5	17.5	17.3	7.1
Sharon Ridge, Scurry:											
Canyon Reef limestone, Penn.	6,650- 6,680	45.4	B.G.	0.18	35	0.9	42.2	62.1	15.3	19.8	5.1
Snyder, North, Scurry:											
Canyon Reef limestone, Penn.	6,260- 6,419	43.4	B.G.	0.22	36	1.0	42.2	60.8	15.1	18.6	5.5
Strawn limestone, Penn.	7,322	39.8	G.B.	0.23	38	1.8	36.7	60.5	20.9	17.9	7.5
Strawn limestone, Penn.	7,487- 7,508	44.1	B.G.	0.19	35	0.7	40.8	62.1	15.4	21.3	4.0
Ellenburger limestone, Ord.	7,735	41.3	D.G.	0.37	38	1.9	37.1	63.1	21.1	17.5	7.6
Spartan, Kent:											
Strawn limestone, Penn.		39.6	D.G.	0.40	38	1.9	36.1	60.8	21.3	17.6	7.8
Vealmoor, Howard:											
Canyon Reef limestone, Penn.	7,934- 7,966	43.4	B.G.	0.10	36	0.8	41.1	61.0	19.0	22.8	3.7
Von Roeder, Borden:											
Canyon Reef limestone, Penn.	7,100- 7,254	41.7	D.G.	0.26	38	1.4	39.5	62.3	21.5	18.6	5.8
SPRABERRY TREND AREA											
Schrock, Midland:											
Upper Spraberry sand	7,000	37.6	B.G.	0.21	45	1.3	33.8	59.7	29.3	17.9	3.9
Pembrook, Upton:											
Upper Spraberry sand		36.8	B.G.	0.22	45	1.5	31.6	59.2	29.3	17.6	4.4
Driver, Midland:											
Upper Spraberry sand		37.0	B.G.	0.19	46	1.4	33.4	60.8	29.6	17.8	5.7
Tex Harvey, Midland:											
Upper Spraberry sand	7,010- 7,110	38.4	B.G.	0.16	41	1.2	39.1	59.7	25.7	17.8	5.6
Gail, Northeast, Borden:											
Upper Spraberry sand	5,535	37.6	B.G.	0.20	44	1.2	33.7	58.9	27.3	17.8	5.5
Midkiff, Midland:											
Spraberry		37.2	B.G.	0.18	44	1.3	33.9	60.0	29.5	18.2	5.2
Dean, Dawson:											
Spraberry sand	7,276- 7,286	41.9	B.G.	0.15	35	0.7	44.8	60.0	15.1	16.2	5.5
Benedum, Upton:											
Lower Spraberry sand		40.2	B.G.	0.14	41	0.8	38.3	60.2	23.4	19.5	4.0
Spraberry (Deep), Dawson:											
Spraberry (Deep) sand	6,770- 6,811	37.2	B.G.	0.17	41	1.4	36.1	58.7	25.5	16.0	6.6
Susan Peak, Tom Green:											
Lower Strawn, Penn.	4,753- 4,772	36.8	B.G.	0.35	42	1.4	34.3	57.7	21.7	17.5	5.9
Main Strawn, Penn.	4,820- 4,830	35.0	B.G.	0.30	44	1.9	29.1	57.2	25.2	17.8	6.7
Cisco Canyon, Penn.	4,385- 4,926	39.6	D.G.	0.15	40	0.8	34.4	57.9	20.8	22.0	3.6
Three Bar, Andrews:											
Devonian limestone	8,300- 8,385	39.4	B.G.	0.61	39	1.7	36.2	61.8	23.3	17.9	6.4
Upper Three Bar limestone, Dev.	8,390- 8,420	40.4	B.G.	0.45	38	1.0	38.0	61.0	20.3	16.5	4.4
Toborg, Pecos:											
Toborg sand, Cret.	325- 395	20.2	B.B.	2.08	290	5.8	9.5	49.7	41.1	10.1	13.2
Todd (Deep), Crockett:											
Ellenburger limestone, Ord.	6,330	41.3	N.P.A. 8	0.32	38	0.8	36.2	60.8	20.8	22.5	3.4
Tunstill, Reeves:											
Delaware Mountain limestone, Perm.	3,306- 3,316	38.4	Green	0.15	35	1.0	34.0	56.4	22.8	21.3	3.8
TXL, Ector:											
Devonian dolomitic limestone	8,050-10,181	38.6	B.G.	0.50	41	1.6	32.8	59.7	23.5	18.2	6.0
Ellenburger limestone, Ord.	9,563- 9,793	44.1	B.G.	0.19	37	1.1	33.7	65.6	20.4	20.8	4.8
University-Waddell, Crane:											
Devonian limestone and chert	8,510- 9,225	41.7	Green	0.14	37	3.9	37.7	58.4	17.6	23.0	19.8
Ellenburger limestone, Ord.	10,790-10,925	44.9	Green	0.13	36	0.7	35.7	65.3	16.7	22.1	3.9
Vaughn, Crockett:											
Queen sand, Perm.	1,262	31.0	G.B.	0.58	58	3.4	24.0	54.7	29.6	13.8	10.4
Grayburg, Perm.	1,394- 1,438	28.4	G.B.	2.76	71	3.6	18.7	54.7	32.1	13.2	10.1
Wasson, Yoakum:											
Permian limestone	4,950- 5,150	32.8	B.B.	1.85	44	3.8	33.3	56.5	27.5	12.0	12.0
San Andres dolomite, Perm.		33.4	B.G.	1.80	43	3.3	33.7	56.9	26.0	12.0	11.1
Welch, Dawson:											
Permian limestone	4,830- 4,935	32.3	G.B.	2.14	45	3.6	31.7	56.2	27.0	12.5	11.7
Wentz, Pecos:											
Ellenburger limestone, Ord.	4,327- 4,440	34.4	G.B.	0.63	55	2.4	24.4	60.0	32.1	18.7	6.7
Wheeler, Winkler:											
Ellenburger limestone, Ord.	10,559-10,601	40.4	D.G.	0.31	42	2.2	30.3	64.2	24.3	20.2	8.0
Devonian dolomitic limestone	8,347	44.5	B.G.	0.19	36	1.1	36.6	66.1	18.2	20.3	5.2
Yarbrough and Allen, Ector:											
Ellenburger limestone, Ord.	10,627-10,750	40.9	G.B.	0.19	41	2.3	30.8	66.1	24.5	17.8	8.0
Yates, Pecos:											
Permian limestone	1,655- 1,844	22.1	B.B.	2.79	179	5.8	13.2	52.5	50.4	12.5	10.7

*Geologic age names are abbreviated as follows: Ordovician, Ord.; Pennsylvanian, Penn.; Permian, Perm.; Devonian, Dev.; Cretaceous, Cret.; Silurian, Sil. †Colors are abbreviated as follows: Green, no abbreviation; dark green, D.G.; brownish green, B.G.; greenish black, G.B.; brownish black, B.B.; N.P.A., numbers.

Photo courtesy Massey-Harris Co., Ltd., Toronto, Ontario, Canada.

Chrysler powers 70-acre-a-day combine



"'King-size' for today's 'king-size' grain crops" . . . that's one way you might describe this new self-propelled combine shown here hard at work in a wheat field. It has a sixteen-foot, hydraulically controlled auger table and cutting bar which picks up and cuts in any of three widths. Extra-capacity rub bars and straw walkers help assure more complete threshing. Covers plenty of territory with maximum speed of more than fourteen miles per hour, hydraulically controlled through variable speed drive.

To power this combine, Massey-Harris uses the mighty Chrysler Industrial Model 8 Engine with 250 cubic inches displacement. In other Massey-Harris combines the slightly smaller Industrial Model 5 Engine is used. By so doing, this manufacturer makes certain that his combines will give top-notch performance—the kind farmers can depend upon to get in their valuable crops year after year.

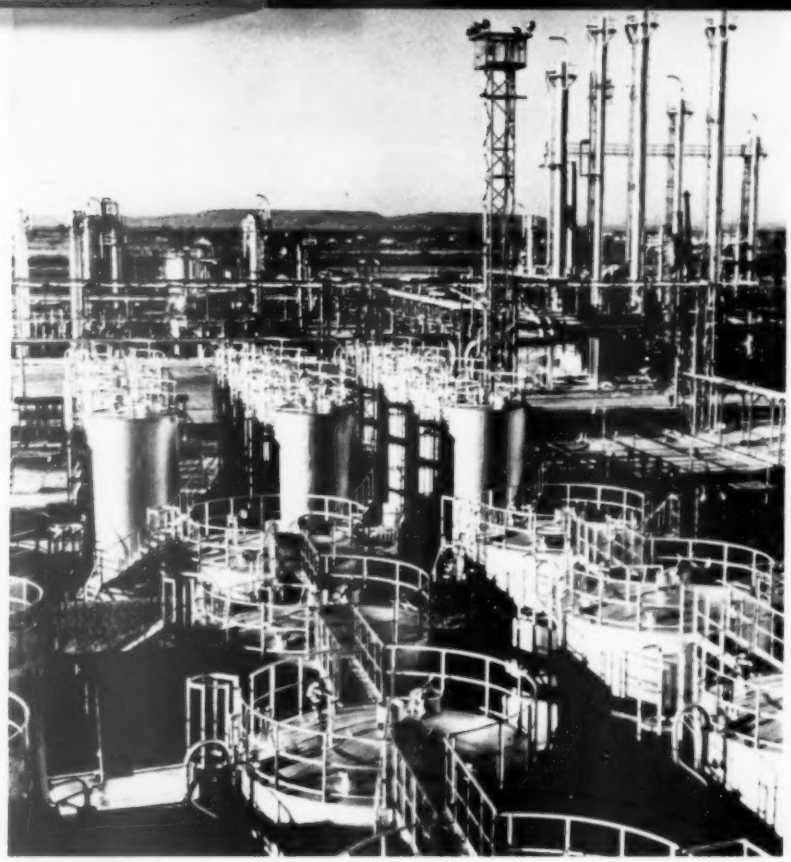
Manufacturers select Chrysler Engines *equipped* to meet their needs. For example, they can have engines with standard or gear-driven front ends (with magneto or hydraulic pump drive), twelve or twenty-four volt electrical systems, standard, gyrol Fluid Coupling or torque converter transmissions.

They find too that Chrysler-Industrial Power is not expensive. Production-line methods adapted to specialized industrial engine building provide a custom-built engine at mass-production prices.

See the nearest Chrysler Industrial Engine Dealer or write: ***Dept. 159 Industrial Engine Division, Chrysler Corporation, Trenton, Michigan.***

CHRYSLER
Industrial Engines

HORSEPOWER WITH A PEDIGREE

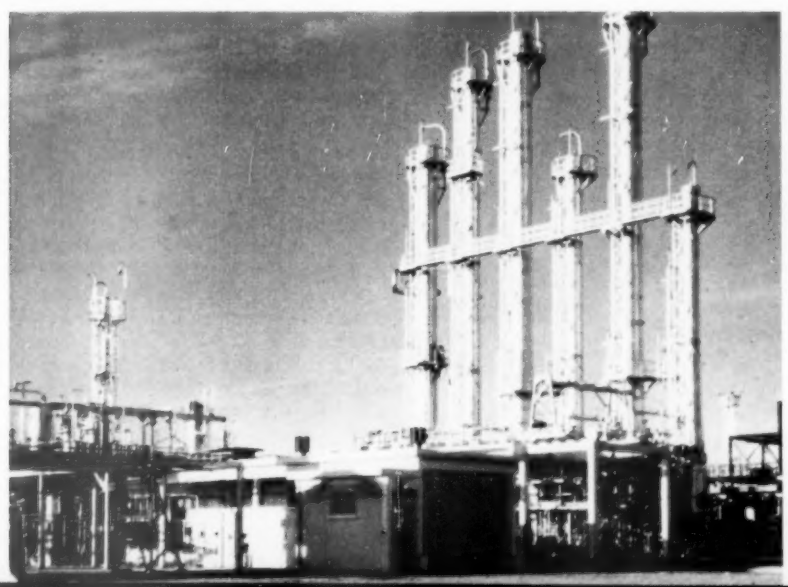


The Berre petrochemical plant, near Marseilles, France, has a capacity of 7,500 tons per year of acetone and other solvents.

PETROCHEM REPORT

Berre Plant First in France to Produce Acetone From Petroleum

Feed stock is a propane-propylene stream obtained from the nearby Shell-Berre refinery. Shown here is acetone plant.



ONLY 16 months after the inauguration of its pioneer plant manufacturing the synthetic detergent, Teepol, at Petit-Couronne, Societe Shell Saint-Gobain placed another chemical installation in service at Berre, France.

The Berre chemical plant, first in France to produce acetone from petroleum, was constructed at a cost of $4,000,000, of which only 3.5 per cent was paid out in foreign currency for special equipment not procurable locally, and 6 per cent for design work by American, British, and Dutch specialists.

The range of solvents manufactured at the Shell Saint-Gobain plant includes—

Ketones:

- Acetone
- Methyl isobutyl ketone
- Diacetone alcohol

Alcohols:

- Isopropyl alcohol
- Methyl isobutyl carbinol, and an

Ether:

- Isopropyl ether.

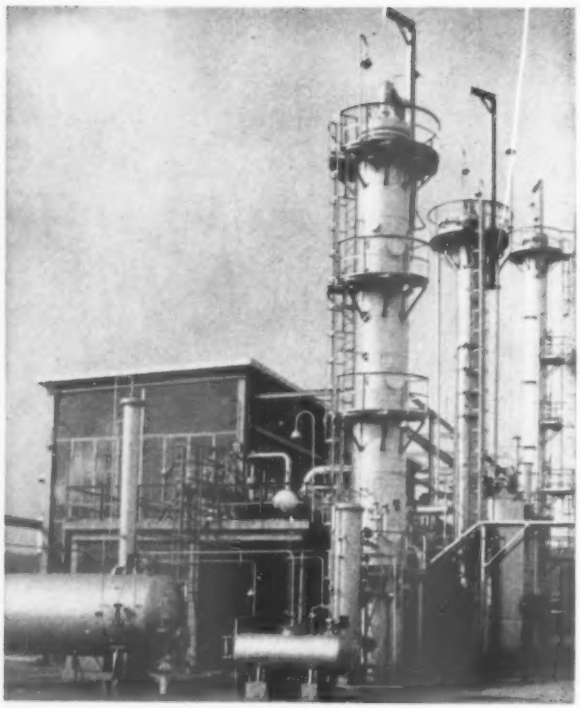
Raw material . . . The raw material used is a propane-propylene stream which is a byproduct from the adjoining refinery belonging to the Compagnie de Raffinage Shell Berre. It is obtained in the course of normal reforming and cracking operations in this plant. And to facilitate flexibility in the reception and consumption of this raw material, storage under pressure is provided at the chemical installation in horizontal cylindrical tanks.

The total production capacity at present is 16.5 million pounds per year, but the installation has been built in such a way that the respective quantities of the various solvents manufactured can be adapted to meet market needs.

Operation of the Berre chemical plant is enabling the tonnage of solvents imported into France from foreign countries to be reduced, resulting in an annual saving in foreign currency of approximately $700,000.

Alcohol production . . . The C_3 stream is composed largely of propylene with propane as the chief accompanying hydrocarbon. The first step involves transformation of propylene into isopropyl alcohol. The mixture of propylene and propane is treated with sulfuric acid, the proportion of acid to hydrocarbon and the temperature of the reaction being regulated, so that practically all the propylene is absorbed by the acid to form the esters isopropyl hydrogen sulfate and diisopropyl sulfate. The unabsorbed hydrocarbon, largely propane, is separated

The reforming unit at the adjoining Shell-Berre refinery from which feed stock is obtained for petrochemicals manufacture.



The synthetic detergent "Teepol" is made in these units. The sulfation building is to rear and recovery section is at right.

from the acid layer and, after distillation and treatment with caustic soda, is fed to the fuel-gas system.

The acid layer, after separation, is progressively diluted with water to hydrolyze the esters previously formed to yield isopropyl alcohol and sulfuric acid. Separation of alcohol from the acid is carried out in strippers, where steam is injected to assist in the distillation.

The isopropyl alcohol so produced is not pure at this stage, but is associated with water and impurities, such as isopropyl ether, formed in side reaction to the main process. In order to obtain alcohol of a very high purity it is necessary to subject the crude alcohol to a distillation step, which involves the careful use of several columns.

The reactions involved in the process are as follows:

$$CH_3\text{-}CH=CH_2 + H_2SO_4 \longrightarrow \begin{matrix}CH_3\\CH_3\end{matrix}\!\!>\!CH\,HSO_4$$

ISOPROPYL HYDROGEN SULFATE

$$2\,CH_3\text{-}CH=CH_2 + H_2SO_4 \longrightarrow \left(\begin{matrix}CH_3\\CH_3\end{matrix}\!\!>\!CH\right)_2 SO_4$$

DIISOPROPYL SULFATE

$$\begin{matrix}CH_3\\CH_3\end{matrix}\!\!>\!CH\,HSO_4 + H_2O \longrightarrow \begin{matrix}CH_3\\CH_3\end{matrix}\!\!>\!CHOH + H_2SO_4$$

ISOPROPYL ALCOHOL

$$\left(\begin{matrix}CH_3\\CH_3\end{matrix}\!\!>\!CH\right)_2 SO_4 + 2H_2O \longrightarrow 2\begin{matrix}CH_3\\CH_3\end{matrix}\!\!>\!CHOH + H_2SO_4$$

ISOPROPYL ALCOHOL

Very close control over reactions is essential. An average of 400 laboratory determinations per day is made. Finished products are obtained within close tolerances.

The chemical plant receives sulfuric acid from a fertilizer factory belonging to Saint-Gobain at nearby Port-de-Bouc. The fresh acid is used for hydrolysis at Berre, and the spent acid returned for producing superphosphates at Port-de-Bouc.

Acetone process . . . The next process involves conversion of isopropyl alcohol to acetone. When isopropyl alcohol is passed over a suitable catalyst at high temperatures it is broken down into hydrogen and acetone. The hydrogen is in a high state of purity and is suitable for other hydrogenation reactions. The acetone is separated from the isopropyl alcohol and subsequently refined by successive distillation steps. The dehydrogenation reaction is expressed thus:

(Continued on page 117)

TABLE 1—USMC TANKER RATES TO EUROPE, THE MEDITERRANEAN AND ATLANTIC PORTS
(Dollars per 2,240 lb., mainly for 1946)

To—	From U. S. Gulf	From N.W.I. Trinidad-Venezuela	From Bahrein-Ras Tanura	From Haifa-Tripoli (Syria)	From Others	
EUROPE:						
United Kingdom, French Atlantic, Belgium, Germany, Netherlands	[1]7.65	[1]6.55	[1]10.90	[1]5.45	San Francisco	[1]12.90
					Los Angeles	[1]12.30
Bergen and northward (Norway)	[1]8.45	[1]7.35	[1]12.40	[1]7.05		
Malmo—Stockholm range	[1]8.65	[1]7.55	[1]12.20	[1]6.85		
Stockholm—Ornskoldsvik range	[1]9.15	[1]8.05	[1]12.80	[1]7.35		
MEDITERRANEAN:						
Gibraltar—Casablanca range	[1]7.35	[1]5.65	[1]9.15	[1]3.75	Los Angeles	11.60
Oran—Bougie range	[1]8.05	[1]6.35	[1]8.55	[1]3.30		
French ports	[1]8.45	[1]5.75	[1]8.55	[1]3.20		
Phillipville Tripoli (Libya) or Sicily or Malta	[1]8.75	[1]7.05	[1]7.85	[1]2.60		
Vado—Naples (Italy)	[1]8.75	[1]7.05	[1]8.15	[1]2.80	Los Angeles	13.00
Taranto—Bari (Italy)	[1]9.25	[1]7.55	[1]7.75	[1]2.40		
Venice—Trieste (Italy)	[1]9.75	[1]8.05	[1]8.25	[1]2.90		
Piraeus—Salonika (Greece)	[1]9.75	[1]8.05	[1]7.35	[1]2.10	Los Angeles	14.00
Istanbul	[1]10.10	[1]8.35	[1]7.55	[1]2.20		
ATLANTIC ISLANDS AND AFRICA:						
Las Palmas, Canary Islands	[1]6.75	[1]4.95	[1]10.20			
St. Vincent, Cape Verde Islands		[1]4.25				
Dakar—Marshall (Africa)		[1]5.15	[1]11.80	*5.70		
Capetown—East London range		[1]8.95	[1]7.15	[1]9.55	Palembang	[1]8.25
UNITED STATES GULF COAST		2.75	[1]14.55	[1]9.60	Los Angeles	7.00
					Kuwait	[1]14.90
ATLANTIC PORT, NORTH OF CAPE HATTERAS	2.85	2.70	[1]12.70	[1]7.80	Los Angeles	7.75
					Kuwait	[1]13.05

*Estimate. (1) USMC Rate Order 438, February 1, 1946. (2) USMC miscellaneous May 15, 1948.

Cost of Tanker Transportation—USMC Rates

Here are three tables listing USMC tanker rates, and another table showing changes that have occurred in transport rates since 1922

by W. L. Nelson*

TANKER-TRANSPORTATION costs are usually stated as percentages of the old rates of the now inactive U. S. Maritime Commission (USMC). The last USMC rates were published mainly during the year 1946 but a few were released during October 1945 and May 1948. Scarcely any change in the rates occurred during this period (October 1945-May 1948) and hence the basis or date of the USMC rates may be considered as 1946. Most of the USMC rates are tabulated in Tables 1 and 3.

During recent months a surplus of oil-tanker transportation has arisen, especially a surplus of older-type vessels. Accordingly, tanker-transportation rates have decreased sharply to USMC minus 40 per cent for shipments from Venezuela to even minus 55 per cent for shipments from the Persian Gulf. Long-term contracts have not been cut so sharply (some reported at USMC minus 15 per cent) but they are much lower than the peak spot wartime rates of USMC plus 200 per cent.

These low rates, coupled with the low cost of Middle East oil ($2.00 per bbl. for 36° A.P.I. crude) permits the delivery of Middle East oil to the eastern coast of the United States at a price equal to or lower than the delivered cost of Venezuelan or United States crude oils. Negotiations are under way for the delivery of Middle East oils to refineries in Brazil and Chile, even though the distance from the Persian Gulf is greater by 5,000-7,000 miles than from Venezuela.

USMC rates (1946) are shown in Tables 1, 2, and 3 for shipments from:

United States Gulf
Netherlands West Indies
Venezuela and Trinidad
Ras Tanura or Bahrein
Haifa-Tripoli (Syria)
Kuwait
Palembang
Los Angeles and San Francisco

to numerous destinations in the following regions:

Alaska
Atlantic U. S. A. and Islands
Africa
Brazil
Central America
Canada
Far East
Oceania
South America
Pacific U. S. A. and Islands

These are stated as United States dollars per long ton (2,240 lb.) and may be converted on a pure weight basis to dollars per barrel by dividing by about 8.7 for gasoline or by about 6.45 for fuel oil. However, clean-tanker rates are usually somewhat larger than dirty rates. Thus, the USMC rates of transportation from Ras Tanura

*Refinery consultant and technical editor, The Oil and Gas Journal.

TABLE 2—USMC TANKER RATES TO THE CARIBBEAN, SOUTH AMERICA AND ATLANTIC PORTS
(Dollars per 2,240 lb., mainly for 1946)

To—	From U. S. Gulf	Bahrein-Ras Tanura	Aruba Curacao	Trinidad Guiria-Caripito	Los Angeles	Others	
BERMUDA	[2]2.95	[2]12.60	[4]2.25			Kuwait	[2]12.95
CUBA:							
Havana, Mariel, or Matanzas	[1]1.70		[4]2.00-2.10				
Santiago—Boqueron	[2]2.25-2.30		[4]1.45				
JAMAICA, KINGSTON	[2]2.25		[4]1.35				
PUERTO RICAN ports	[2]2.75-2.85		[4]1.25-1.35				
CENTRAL AMERICA:							
Puerto Barrios	[5]1.95		[2]2.10				
Cristobal	[2]2.55		[5]1.50		[5]5.50		
Balboa	[5]3.65		[2]2.60		[5]4.35	San Francisco	[5]4.75
San Jose	[2]4.70		[5]3.65		[2]3.20	San Francisco	[2]3.70
BRAZIL:							
Para	[7]5.40		[3]3.25	[2]2.75			
Fortaleza	[7]5.85		[3]3.65	[3]3.15			
Pernambuco	[7]6.40		[3]4.15	[3]3.65			
Bahia	[7]7.15		[3]4.85	[3]4.35			
						Kuwait	[2]12.85
Rio de Janeiro	[7]7.85	[2]12.50	[3]5.50	[3]4.95	[2]11.45	Haifa-Tripoli	[2]9.45
						San Francisco	[2]11.95
Santos	[7]8.25	[2]12.90	[3]5.90	[3]5.35		Haifa-Tripoli	[2]9.90
						Kuwait	[2]13.25
Rio Grande	[7]8.90		[3]6.45	[3]5.90			
Rio de Janeiro and Santos	[7]8.35		[3]6.00	[3]5.45			
RIVER PLATE:							
Montevideo	[7]9.25	[2]12.80	[7]6.80	[7]6.25	[2]10.90	Haifa-Tripoli	[2]10.90
						Kuwait	[2]13.15
La Plata	[7]9.65	[2]13.40	[7]7.20	[7]6.60		Haifa-Tripoli	[2]11.35
						Kuwait	[2]13.75
Buenos Aires	[7]9.70	[2]13.45	[7]7.20	[7]6.65	*11.50	Haifa-Tripoli	[2]11.45
						Kuwait	[2]13.80
Campana	[7]9.75		[7]7.30	[7]6.70			
San Lorenzo	[2]10.00		[7]7.50	[7]6.95			
PERU:							
Talara	[4]4.85		[3]3.80				
CHILE:							
Arica			[5]5.25		[5]6.40		
Taltal—Chanaral	[5]6.80		[5]5.70		[5]6.80-6.90		
Talcahuano			[5]6.50				
Valparaiso	7.30	16.40	6.25		7.25		
COLOMBIA:							
Buenaventura			[3]3.20				
UNITED STATES EAST COAST†:							
Portland, Portsmouth or Boston	[9]3.15	[2]12.70	[2]2.85	[3]3.10			
Fall River, Providence, Tiverton, New Haven or Bridgeport	[2]2.95	[2]12.70	[2]2.70-2.75	[3]3.00-3.05			
New York, Phila., Baltimore	[2]2.85	[2]12.70	[2]2.70	[3]3.00	[2]7.75	San Francisco	[2]8.20
Norfolk	[2]2.60	[2]12.70	[2]2.50	[2]2.85			
UNITED STATES (Southeast Coast):							
Charleston or Savannah	[2]2.15		[2]2.25	[2]2.70			
Jacksonville	[2]2.00		[2]2.15	[2]2.65			
Port Everglades or Miami	[1]1.65		[1]1.85	[2]2.45			
CANADA (EAST COAST):							
Halifax	[10]3.35		[11]2.95	[11]3.15			
Montreal	[10]4.50	[2]12.85	[11]4.05	[11]4.25		Kuwait	[2]13.20
						Haifa	[2]8.55

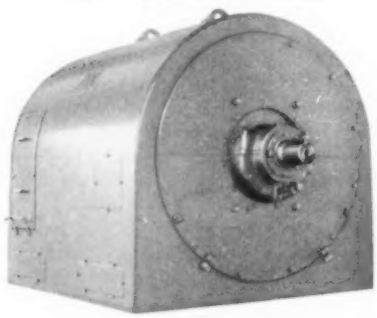
*Estimate. (2) USMC miscellaneous, May 15, 1948. (3) USMC Rate Order 398, October 15, 1945. (4) USMC Rate Order 139, October 15, 1945. (5) USMC Rate Order 400, October 15, 1945. (6) USMC Rate Order 141, October 15, 1945. (7) USMC Rate Order 401, October 15, 1945. (8) USMC Rate Order 142, October 15, 1945. (9) USMC Rate Order 432, January 30, 1946. (10) USMC Rate Order 395, October 12, 1945. (11) USMC Rate Order 137, October 15, 1945. †Today the single rate for North of Cape Hatteras is used for all ports.

Sinclair Selects...

Sinclair Pipe Line Company's new 670-mile, 24 and 22-inch line stretches from Cushing, Oklahoma, to East Chicago, Indiana. Ultimate capacity ranges from 280,000 bbl a day for the 24-inch portion of the line to 210,000 bbl a day for the 22-inch portion.

Pictured above are the 900-hp and three 1750-hp, 1800-rpm squirrel-cage motors at Humboldt, Kansas.

Below is a 1250-hp motor for one of the more northeasterly stations. This view shows the cover-plate arrangement used to permit internal lead connections and eliminate the need for terminal boxes.



All seven stations on new big-inch crude oil line are powered by Allis-Chalmers motors

MORE AND MORE of these forced-ventilated motors are being installed in oil and gas pipe-line stations. Used with a common ventilating system they provide these advantages:

- They cost very little more than open motors.
- Protection for hazardous locations is provided by supplying the ventilating air under pressure — during starting and during operation.
- Maintenance is minimized because the motors operate in cool, clean air.
- Motors are designed for the installation. They can, for example, be built for base, side or top air ducts.
- Design details assure easy, economical installation and maintenance. Capsule-type housings permit access to motor interior without exposing bearings. Dual oil rings provide uniform uninterrupted lubrication.

Your A-C representative can help you decide where to use these modern motors. Allis-Chalmers, Milwaukee 1, Wisconsin.

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ALLIS-CHALMERS

TABLE 3—USMC TANKER RATES TO PACIFIC PORTS AND THE FAR EAST

(Dollars per 2,240 lb., mainly for 1946)

To—	From— U.S. Gulf	N.W.I. Trinidad-Venezuela	Bahrein-Ras Tanura	Aruba Curacao	Los Angeles	San Francisco	Others	
ALASKA:								
Ketchikan					[12]2.55	[12]2.10		
Cordova, Valdez, Whittier or Seward					[12]3.20	[12]2.75		
Nome					[12]4.40	[12]3.90		
CANADA (West Coast):								
Vancouver			[2]16.25		[14]2.00	[14]1.60	Trinidad, Guiria, Caripito	[2]8.40
Ocean Falls					[14]2.20	[14]1.75		
UNITED STATES (West Coast):								
Los Angeles	[9]7.75	11.60				[9]0.95		
San Diego		11.60			[9]0.65	[9]1.05		
Monterey					[9]0.90	[9]0.65		
Columbia River, Willapa Bay, or Grays Harbor ports					[9]1.65-1.80	[9]1.30-1.40		
Puget Sound ports	[2]8.45	[2]7.40			[9]1.90-2.00	[9]1.50-1.60		
HAWAII:								
Oahu Island	[12]9.70		[12]13.95	[2]8.75	[12]3.50	[12]3.30	Trinidad, Guiria, Caripito	[12]9.55
FAR EAST:								
Manila	[13]18.45		[2]7.85	[13]17.20	[13]10.20	[2]9.80	Palembang	[2]3.05
Hong Kong	[13]18.20		[2]8.00	[2]16.95	[2]9.95	[2]9.55	Palembang	[2]3.30
							Haifa	*12.20
Shanghai	[13]17.20		[2]9.20	[13]15.95	[2]8.85	[2]8.45	Palembang	[2]4.35
							Haifa	13.15
Yokohama	[13]15.40		[13]10.20	[13]14.20	[2]7.60	[2]7.20	Palembang	*5.00
							Haifa	*14.50
Singapore	*20.28	*18.65	[16]5.75		*12.70		Tarakan	2.70
							Haifa	*9.85
INDIA, CEYLON, BURMA:								
Karachi—Bombay range	[2]15.90	[2]14.20	[2]2.40		[2]14.80	[2]14.40	Palembang	[2]5.05
							Haifa	[2]6.65
Colombo	[2]16.70	[2]15.00	[2]3.75		[2]13.50	[2]13.10	Haifa-Tripoli	[2]7.45
Calcutta—Rangoon	[2]18.35	[2]16.60	[2]5.35		[2]13.20	[2]12.80	Haifa	[2]9.05
							Palembang	[2]3.45
CENTRAL AMERICA:								
Balboa	[2]3.65			[2]2.60	[2]4.35	[2]4.75		
San Jose	[2]4.70			[2]3.65	[2]3.20	[2]3.70		
OCEANIA:								
Sidney	14.90	14.10	11.30		9.75		Palembang	*6.15
New Zealand ports	13.30	12.50	12.20		9.15		Palembang	*7.40

*Estimate. (2) USMC miscellaneous, May 15, 1948. (5) USMC Rate Order 400, October 15, 1945. (6) USMC Rate Order 141, October 15, 1945. (9) USMC Rate Order 432, January 30, 1946. (12) USMC Rate Order 600 and 601, August 21, 1946. (13) USMC Rate Order 138, October 15, 1945. (14) USMC Rate Order 397, October 15, 1945. (15) USMC Rate Order 434, January 1, 1946. (16) USMC Rate Order 436, January 1, 1946.

to Atlantic ports north of Cape Hatteras (see Table 1) are about:

$$\text{Bunker C} = \frac{12.70}{6.45} = \$1.97 \text{ per bbl.}$$

$$32^\circ \text{ A.P.I. crude} = \frac{12.70}{7.4} = \$1.72 \text{ per bbl.}$$

$$\text{Gasoline} = \frac{12.70}{8.7} \times 1.2 = \$1.75 \text{ per bbl. (approx.)}$$

At the present time the rate for crude oil is about half (USMC minus 50 per cent) for spot shipments or about 85 per cent (USMC minus 15 per cent) for 5-year contracts.

Table 4 shows the changes that have occurred in transport rates since the year 1922. It is based primarily on the yearly rates published in Platt's Oil Price Handbook but some other references (1-10) were also utilized. Current rates can be obtained from news releases, etc., in The Oil and Gas Journal, other business magazines, Platt's Oilgram, and schedules released by Davies & Newman of London, or Dietz, Inc., of New York. USMC rates are most widely used especially by United States organizations but in addition, the British Ministry of Transport (MOT) has published many rates for foreign-flag ships. The MOT schedule is being replaced by the London Market Nominal Freight Scale (known as SCALE). This new schedule (SCALE) is reported at intervals by Dietz, Inc., of New York.

It appears that the indexes (Table 4) for clean-tanker service have been higher (up to 35 units) than the indexes of the (more common) dirty-tanker service (crude oil or black fuel oils). Although this relationship occurs both before and after 1946, it is not certain that such a behavior will continue in the future. It may only mean that too low clean rates were stated by the U. S. Maritime Commission during 1945-1948.

TABLE 4—APPROXIMATE INDEXES OF LONG-TERM TANKER TRANSPORTATION RATES RELATIVE TO 1946 RATES. THE AVERAGE OR WORKING INDEX IS BASED ON DIRTY SERVICE

Year	Gulf-N.Y.			N.W.I.-U.K.,	Ras Tanura		Miscellaneous shipments		Average or working (dirty)
	Clean, Platt's	Dirty, Platt's	Gulf-U.K., Dirty[1]	Dirty, Platt's	Hatteras Platt's	U.K., Platt's	Dirty	Clean	
1922			79						79
1923			106						106
1924			126						126
1925			81						81
1926			111						111
1927			115						115
1928			58						58
1929	*41		79, *56						79
1930			83						83
1931			36						36
1932			34						34
1933			33						33
1934			36						36
1935			43						43
1936	*68.5		47, *37						47
1937	117.3	99	101, *97				*89	*78	97
1938	64	50	57						54
1939	74	59							59
1940	144	106							106
1941	147	130							130
1942	118	110+							110
1943	118	110+							110
1944	118	110+							110
1945	115	108							108
1946	100	100	100	100	100	100			100
1947	100	100							100
1948	135	132		98	91.5				107
1949	72.5	64	*65	71	71.6	66.5	*70, *66		68
1950	105	98	*112	94.5	82	100	*108		99
1951	206	200	*195	*198	116	201	*150, *128, *199	*160	188
1952	181	180		*180	*77	166	*110, *170, *149		158
1953		*90					*100		*95

*Miscellaneous sources on single or a few spot shipments.

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1. Frankel, P. H., Third World Pet. Congress, The Hague, 1951, Sec. IX, p. 183 (shilling valued at 24 cents during 1922-1938).
2. Anon., "Standard" Tanker (rates), Nat. Pet. News, April 8, 1953, p. 48.
3. Anon., "Home and Foreign Market Intelligence," The Pet. Times (London), May 18, 1951, p. 446.
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8. Anon., "Crude Price Drops," The Oil & Gas Journal, Jan. 16, 1953, p. 106.
9. Anon., "Higher Freight Rates," Pet. Press. Service (London), Oct. 1951, p. 332.
10. Duff, D. M., The Oil and Gas Journal, Aug. 11, 1949, p. 52.
11. Platt's Oil Price Handbook, Cleveland.

Berre Plant to Produce Acetone From Petroleum

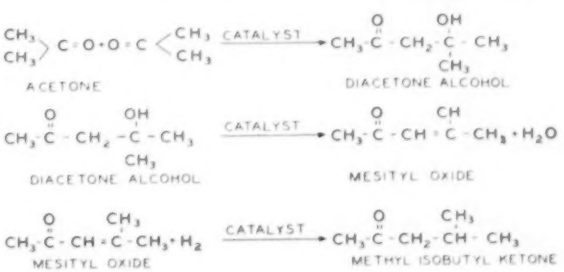
(Continued from page 112)

The preparation of methyl isobutyl ketone from acetone is carried out in three separate stages. The first stage is a condensation of two molecules of acetone to form one molecule of diacetone alcohol. The reaction is carried out at low temperatures in the presence of a suitable catalyst. A partial separation of diacetone alcohol from unconverted acetone is reached by a distillation step. Pure diacetone alcohol is prepared by a further distillation as required.

The bulk of the diacetone is converted to mesityl oxide by the elimination of water from the molecule, a chemical change which is carried out in the presence of a dehydration catalyst at suitable temperatures. This forms the second stage of the process.

Ketone production . . . After distillation to remove the water, acetone, and any unconverted diacetone alcohol, the mesityl oxide is hydrogenated to yield methyl isobutyl ketone. In this last step the mesityl oxide, after vaporization, is mixed with hydrogen and passed over a catalyst. Under favorable conditions a substantial proportion of the mesityl oxide is converted to the methyl isobutyl ketone. Distillation is once more imperative to obtain the pure ketone.

The reactions involved are represented by the following equations:



Very close control over all the reactions is essential and, to this end, an elaborate system of automatic control of the process is incorporated in the design of all units. The crude and finished products are followed at all stages of manufacture and storage by determinations of characteristics on all installations (average 200 per day) or at the laboratory (average 400 per day). The high number of these determinations is justified by the strict limits of specifications imposed for the finished products and by the necessity of re-

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that customers say . . . "We believe Pacific is just about the finest group of pumps we know anything about."

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That in the continuous process industries . . . shutdowns are costly . . . maintenance is a big problem . . . availability of parts and service facilities are important.

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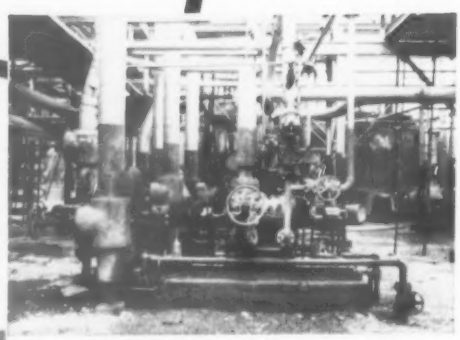
That customers say . . . "Pacific Pumps Inc. is large enough to stand behind the product they manufacture and small enough to give each order individual attention."



It's a Matter of Record

The excellent performance of the two stream turbine driven four stage pumps installed in 1939 to pump light hydrocarbons of .465 sp. gr. operating at 3400 R.P.M. In 1942 the speed was increased to 3900 R.P.M. From 1939 to 1950—time on stream 82 + % . . . pump parts refinished 0 . . . pump parts replaced 0. Third unit installed in 1947 to operate at 4000-4200 R.P.M.

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ducing to a minimum the manufacture of products not conforming with specifications.

Isopropyl alcohol is obtained in the form of azeotropic mixture containing 87 per cent alcohol. The acetone obtained is exceptionally pure, over 99.6 per cent. The diacetone alcohol put on the market is very pure, but if it is used for conversion into methyl isobutyl ketone the specifications are less stringent, as some impurities will in any case be eliminated during its final distillation. The purity of this commercial product is also very high, exceeding 99 per cent.

In view of the large number of products handled, both crude and finished, and taking into account the consumption of raw materials and chemical products, the storage capacity of the plant is about 40,800 bbl., distributed over 58 tanks.

Product shipping . . . The Berre chemical plant receives its raw materials and chemical products by tank truck and tank car except the propane-propylene stream which is received direct from the Shell Berre refinery. It ships its finished product in tank trucks, tank cars, or drums.

The installation for packing and filling drums includes a storage space for empty drums; a washing, de-denting, dry testing, painting, and drying unit; equipment for filling, with automatic scales, and a storage space for full drums. This building is served by a road and two railway lines and embraces, moreover, two filling stations, one for tank trucks, and the other for tank cars. To complete the French effort in the petrochemical field, a plant for the manufacture of Teepol, a synthetic detergent, was opened in October 1951 at Petit-Couronne near Rouen. Utilizing the basic process which has proved successful at the Shell refineries at Stanlow in England and at Pernis in Holland, but incorporating operational experience gained with each, this new installation, with a designed capacity of 55 million pounds per year, brings a proved and versatile detergent to an even wider industrial and domestic market. Plans are under way to enlarge the capacity of the French Teepol plant.

Shell Saint-Gobain, at its Berre and Petit-Couronne plants, employs 230 persons and has spent $575,000 for the construction or acquisition of 45 homes for its staff.

Solvents made at the new Shell-St. Gobain petrochemical plant will go into the manufacture of chemicals for textiles, plastics, paint and lacquer, perfumery and cosmetics and other products.

TABLE 4—EQUIVALENT COST OF FUEL AND ELECTRICITY, 600 PSIG.—750° F.T.T.—CONDENSING STEAM TURBINES VS. ELECTRIC MOTOR DRIVERS FOR LARGE FLUID CATALYTIC CRACKER

(600 psi. steam, Reference Figs. 3 and 4)

Fuel cost		Cost of steam before amortization, cents per 1,000 lb.		Cost of electricity to write off additional investment for steam system—writeoff time in years			
Gas, cents per million B.t.u.	Fuel oil per bbl.	150 psi.	600 psi.	3	4	5	6
5	$0.30	14	15	0.453			
10	0.60	22	24	0.543	0.467		
15	0.90	29	32	0.622	0.547	0.501	
20	1.20	37	41	0.712	0.635	0.590	0.560
25	1.50	45	50	0.802	0.726	0.680	0.650
30	1.80	52	58	0.883	0.806	0.761	0.731

7,000 hours' operation.

Steam Turbine Vs. Electric Drive

(Continued from page 88)

surges or short power interruptions. Use of electric drives in the past has been limited by fear of a power failure. This unknown more than other factors has influenced the engineer's decision and resulted in an overwhelming majority of steam turbine installations. Normally, the steam-generating plant contains a number of units, failure of any one of which would not cause loss of the steam supply.

Continuity record . . . There are many electrical systems whose continuity record is poor. Any electrical system employing a single transmission line of appreciable length is a poor continuity gamble. Inherently, there will be power failures due to equipment failure. Use of a motor-driven main air blower supplied from such an electrical system would be a mistake, regardless of any possible initial capital savings. On the other hand, there are many electrical systems with a proven continuity record. Records of an electrical service company in New York City show that many customers have never experienced a power failure and that on an average, only 1 customer out of each 180 will have a power failure in any one year. The average duration of power failures is 175 minutes.

Dual transmission lines . . . Horsfall, Thompson, Mills, and Bobo, in A.I.E.E. Paper 50-261, (A.I.E.E. Transactions Vol. 69, 1950), described the electrical controls used on the electrical system at the Lima refinery of Standard Oil Co. of Ohio where a large fluid catalytic cracking unit using motor-driven air blowers is located. This paper describes an electrical system that has produced continuous electric service for a period of years.

Distances between major generating stations in most industrial areas are short. An electrical distribution system of moderate length supplied by two or more generating stations and dual transmission facilities with automatic switching between transmission lines will provide a high degree of continuity. A very large proportion of power failures on such systems will last for the time required to switch from one feeder to the other, less than 2 seconds. Simultaneous equipment failure on both systems is unlikely, but if it does occur, would on an average result in long outage times comparable to that experienced in New York City (average 175 minutes).

Experience with units now in operation shows that power failures of a few seconds have little effect and power failures up to 10 seconds can be tolerated. Experience with refineries in general indicates that long power failures usually interfere with the cooling water supply and make operation of any unit involving distillation equipment difficult or impossible.

Watch That Arc!

(Continued from page 97)

row of individual anodes, as illustrated in Fig. 2. This has two additional advantages:

1. It affords a factor of safety insofar as continuity of operation is concerned, for the lead must be severed in two places in order to interrupt operation; and even two breaks, if located within the anode row, will only remove from operation those anodes which lie between them.

2. The other advantage is that the dual feed permits the use of smaller cable, since each lead may be computed as carrying half the total rectifier output; ordinarily, though, this reduction in cost will only partly compensate for the additional length of cable required. It is understood that the breaks referred to in this section are those which may result from corrosive attack on cable splices whose coating is less than perfect; this is not an uncommon occurrence with buried cable.

It is implicit in the above discussion that the piping which is being protected is in fact a continuous network; to attempt the application of cathodic protection to an interrupted network where inflammable vapors may be present is an exceedingly hazardous undertaking; every necessary step should be taken to insure that there are no poorly conducting or insulating joints in such a system.

Where the facility is a refinery or similar establishment, it may be advisable to insulate incoming lines from the plant piping; this should always be done near the boundary of the network area, and steps taken to avert any danger which might arise from accidental short-circuiting of such joints. If the plant is a large one, the added amount of current required for the protection of an adjacent portion of incoming lines is usually quite small in comparison with the total demand of the plant piping, and no insulated joints are actually needed.

Complex networks . . . Often, in the protection of complex networks, there are two or more separate groups of anodes associated with each rectifier. This construction follows logically from the fact—not always fully realized—that the current distribution is influenced far more by the anode location than it is by the pipe connection, and of course it is not at all affected by the rectifier placement.

This use of multiple anode groups increases the possible variety of connections which may be designed. An arrangement such as is shown in Fig. 3 is adaptable to two anode rows; for more complicated arrangements, details can always be worked out, always remembering the basic principle that multiple paths are to be provided; there should be no point at which the current output can be completely interrupted by cutting a single cable.

Joint failures due to moisture penetration and subsequent corrosive attack on the cable will not always make themselves known when multiple path feeders are used. Consequently it is necessary to check from time to time the current flow in each of the possible paths from the rectifier, for if there is a failure in all but one, the safety features are lost completely. This check can best be made by having shunts inserted in each of the leads, preferably at or near the rectifier itself.

Shunts especially designed for this service are available, having a total resistance of 0.001 ohm, or a measured length of the cable may be used, the length required for a given resistance being determined from standard wire tables or by calibration. In some installations it has even been found useful to install a separate shunt in the lead to each individual anode, although this practice is not widely followed.

These concrete covers are used to reduce fire hazard on Richfield Oil Corp. lease lines.

Concrete covers protect lease lines

CONCRETE covers are used to protect lease facility lines at Richfield Oil Corp.'s lease at Wilmington, Calif. These covers measure 5 ft. 4 in. by 5 ft. 5 in. and are 4 in. thick. They are tested for 3,000 psi. A short piece of pipe in the center of each block allows the cover to be lifted out when necessary.

The concrete covers are used to reduce fire hazard as fishermen and pleasure seekers may be using the area. All possible equipment will be placed underground for this reason.

Avoid climbing the christmas tree when changing tubing and casing connections by using this gage block.

Gage block simplifies back-pressure tests

WHEN obtaining the open-flow capacity of a gas well by accurate measurement of well-head pressure at several rates of flow and calculating flow volume, a gage block located just in front of the deadweight gage simplifies connections. This is especially true where the connections to the top of the tubing and top of the casing are changed back and forth several times while waiting for the flow rate to stabilize.

Instead of climbing the christmas tree, the change is simply made by changing to one side or the other of the gage block which remains connected to the tubing and casing heads. An indicating pressure gage on each side of the gage block shows the pressure so that the deadweight gage may be adjusted to nearly the exact pressure before close inspection of the deadweight gage itself is made.

Watch your hands!

NEXT to your eyes, your hands are probably the most important part of your body, when it comes to doing your work. Your hands are your wage earners. Yet they are more often hurt than any other part of the body. In general, about 26 per cent of all industrial injuries to the body happen on the hands or fingers. Of course, that is natural since you do most of your work with your hands.

Here are some of the ways you can protect your hands from injury:

1. Use the right tool . . . Is the hammer, chisel, wrench, screw driver, crowbar the right type and size for the job? A tool that is too light or too heavy, too big or too small for the job may cause serious injury to the hands. And using a wrench for a hammer, a file for a lever, a plier for a wrench can ruin equipment and hands.

2. Use a tool in good condition . . . Dulled cutting edges, mushroomed heads, cracked shafts, stripped jaws are all potentially dangerous to your hands. Don't use a poor tool just "one more time." Turn it in or get it repaired.

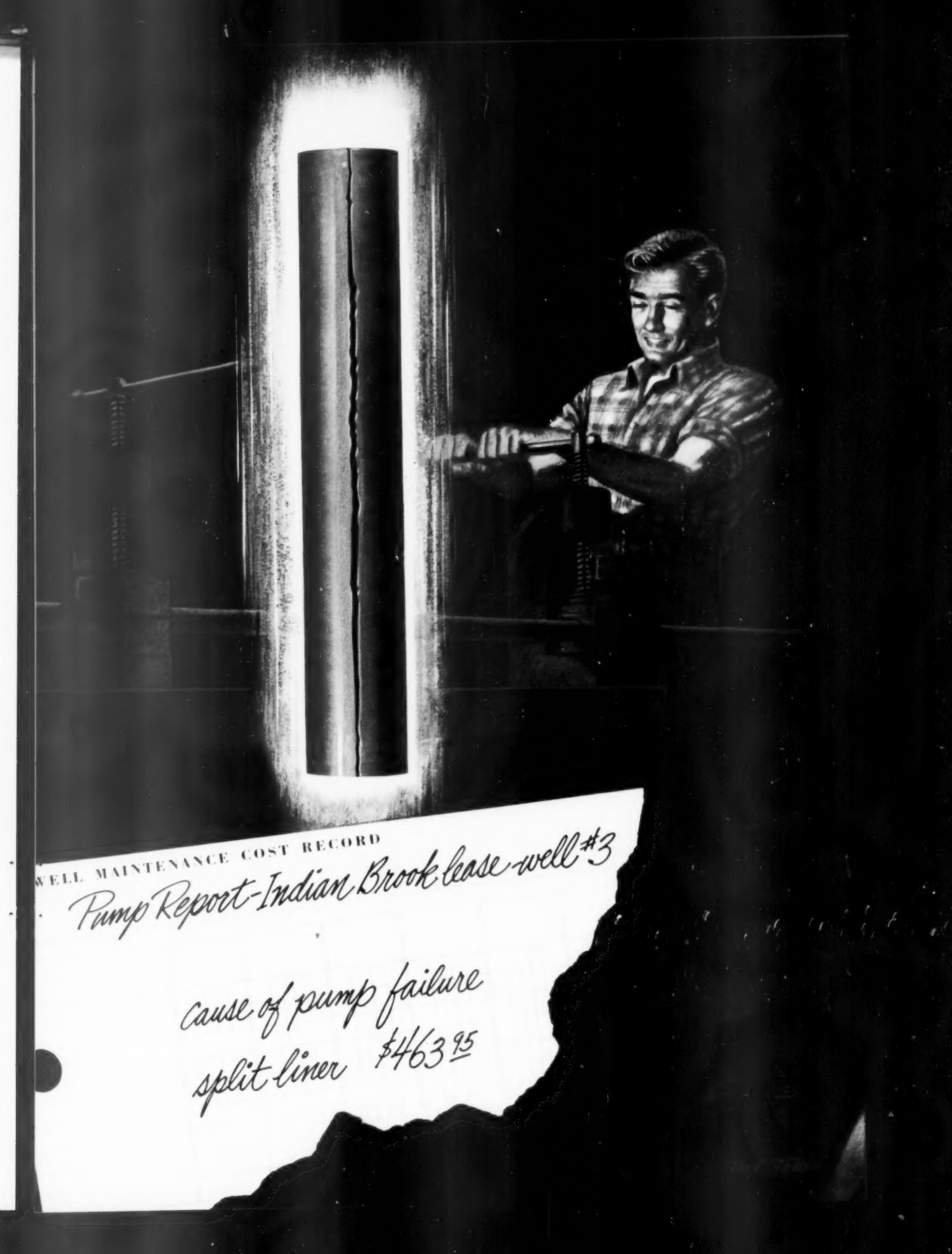
3. Keep your hands away from operating machinery . . . Before repairs are started your first move toward operating machinery should be toward the shutoff switch. More hands have been amputated and mashed because some worker made some other move first. And don't forget that guards are there for your protection. Never operate any machine with the guard out of position. **Keep your hands protected at all times.** One unguarded movement may be costly.

4. Use care in handling materials . . . Wear gloves when you are handling anything that is sharp, blunt, jagged, or splintery. Make sure your hands are clear when you pile materials. Don't sandwich them, don't squeeze them, don't crush them.

5. Get treatment for scratches, cuts, splinters . . . A scratch can rapidly develop into blood poisoning, leading to months of layoff, maybe amputation. Get first aid immediately.

No organization wants its men hurt. The time spent in preparing your hands for the job will not only save trouble for you, but will probably save time in doing the job in the long run. Don't put your hands into trouble. They are your wage-earners. Take care of them.

—From "Sinclair Safety Service" (Sinclair Oil & Gas Co., Tulsa, Okla.).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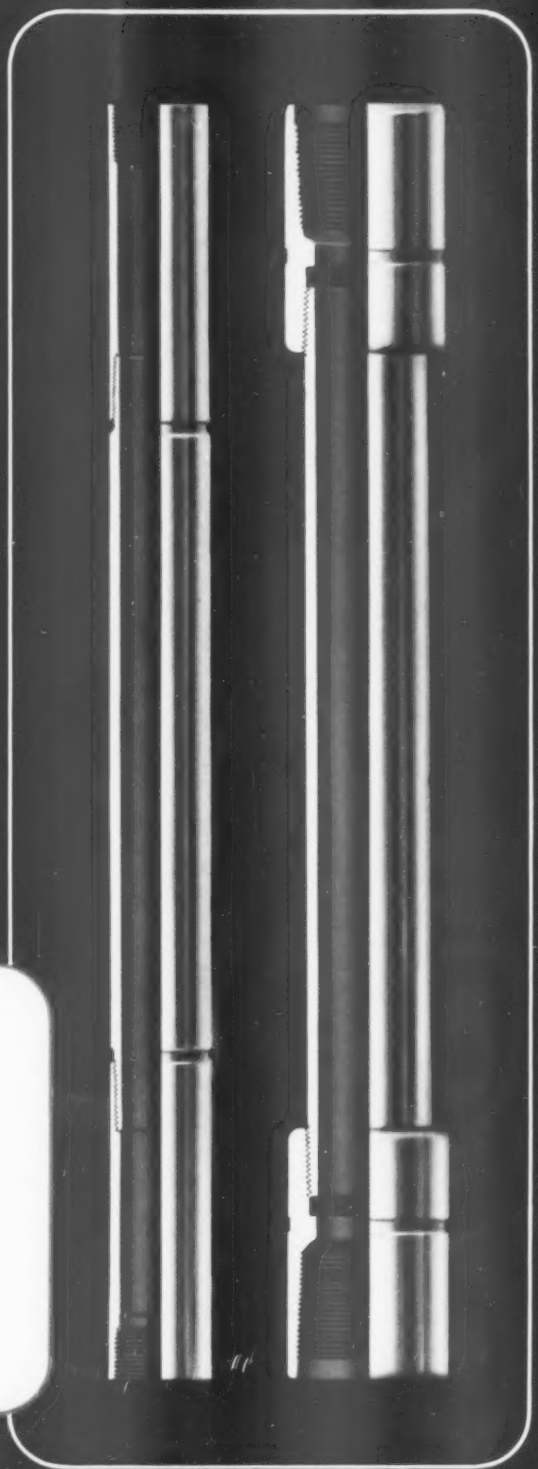

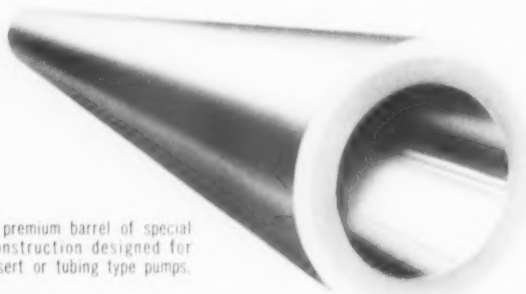

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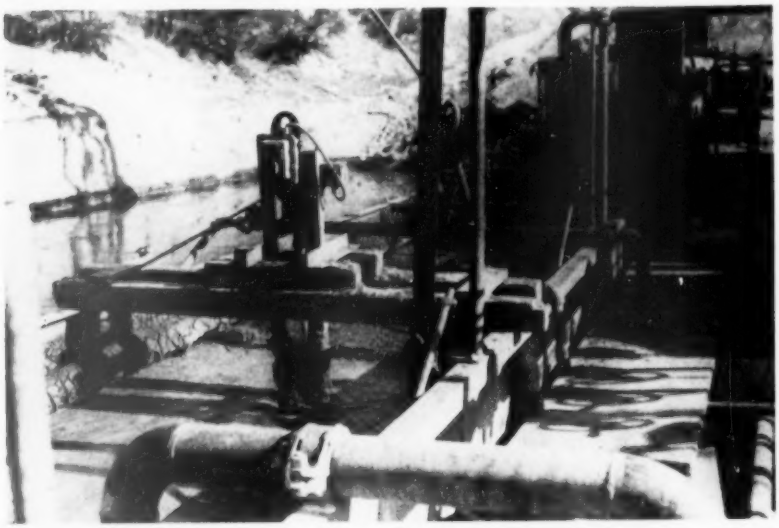


This portable mud agitator employs a volute-type impeller driven by electric motor through speed reducer.

Electric motor drives mud agitator

INSTEAD of using pump pressure through manually operated nozzles, for intermittent stirring of mud in the suction pit, Loffland Brothers Drilling Co. employed at one location a portable unit operated by an electric motor.

The unit, designed to set on skids resting on the rim of the pump suction tank, consists essentially of a low-speed electric motor having an integral speed reducer carrying a long shaft to which is attached a stirring device made with an open volute-type impeller similar in design to that used in a conventional gas engine-jacket water-circulating pump. The motor is mounted on a heavy bracket attached to structural angle supports with cross pieces of similar material to form a footing which rests on the timber skids that support the entire unit on the walls of the pump suction pit.

A long shaft is attached to the output shaft of a speed reducer with a conventional coupling, and carries the agitator at the lower end. The structural angle members attached to the motor bracket extend almost to the floor of the pump suction pit upon which the unit is designed to operate. Near the end of the long drive shaft, the parallel structural angle members are brought near enough to each other so that a bearing retainer can be installed for the long shaft. This bearing, made of rubber, similar in composition to the rubber plungers of the mud pump, is lubricated with drilling fluid.

The stirrer or agitator is a flat circular plate approximately 12 in. in diameter carrying on its upper surface four equally spaced spiral-shaped vanes which drive the fluid outward against the sides of the mud pit. As this mud is displaced, the space is immediately occupied by other mud drawn down from the top surface.

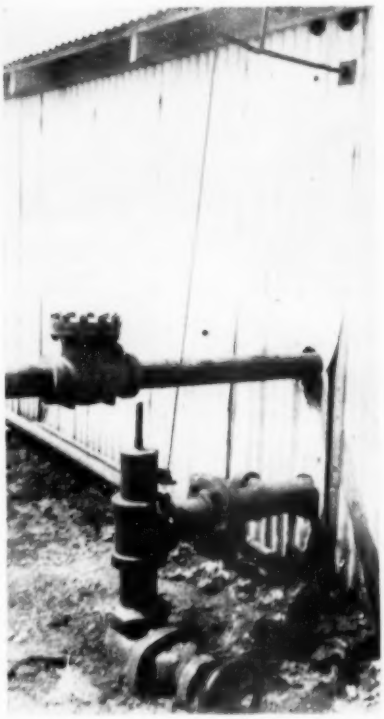
The unit can be adjusted for depth of operation by changing the cribbing on the skid supports. It is lifted from the pit by hooking the bridle of a hoisting cable in an opening cut in the steel backing plate attached to the motor bracket frame.

Adjust Christmas Tree Tie Rods

GAS going to injection wells at high pressures and through a wide range of temperatures subjects the christmas tree to expansion and contraction changes far more severe than are normally met on a well producing at a regular rate.

One company checks the tie rods of the branches of the christmas trees on its injection wells at regular intervals. To insure that the proper socket wrench be at hand for the adjusting nuts on the rods, one is kept at each well. The wrench is wired to one of the tie rods, and painted with aluminum, as is the remainder of the setting. The socket is thus inconspicuous, but readily found by the maintenance crew when the well is checked.

This method of keeping the socket at the well makes it difficult for a switcher or other employes to "borrow" the wrench for use elsewhere. The fact that the socket wrench is wired to the tie rod helps to emphasize the need for it at the well.



Float-operated magneto switch keeps gathering system filled with oil.

Float Shuts Down Gathering Pump

AIR is kept from entering a crude-oil gathering system by a float-operated magneto switch in a South Texas pipe line installation. The switch shuts down the pump when the line becomes dry.

The mechanism consists of a float placed inside a bull plug in a tee connected as shown in the photograph. The float is hooked to the magneto through a stuffing box and chain. The float falls when liquid leaves the pipe, cutting the magneto switch. When the line again fills with oil, the float rises, permitting the engine to be started without disturbing the safety device.

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PUMP SELECTION—10

How to Make Design Calculation

. . . on an existing pump

by Robert L. Jacks*

CALCULATION (Example 1 from preceding installment) is continued here with the following items:

6. Capacity at discharge conditions. This quantity is calculated from the value reported at suction conditions converted to gallons per minute at 0.840 specific gravity as follows:

$$\text{G.p.m.} = (18{,}350/60)\ (0.840/0.882)$$
$$= 294$$

7. Design temperature. The design temperature is usually reported as 50° F. above the maximum value expected in normal operation. The case in question illustrates an exception to this rule and points out the necessity for examination of all the facts. The normal rule would call for a design temperature of only (150 + 50) at 200° F. In this case, however, the tank steam coil illustration must be examined. Low-pressure steam (15 psig.), the condensing temperature of which is 250° F., is used for heating. Allowing for a ΔT drop across the coil of about 50° F., the maximum expected suction temperature at the pump is thus 200° F. and the design maximum is 200 + 50 = 250° F.

8. Maximum suction pressure. The maximum suction pressure on the pump will occur when the tank upstream is full and there is no flow. Since the tank is vented at the top and the maximum liquid level is 30 ft. above grade, the pressure at the pump under these conditions (pump suction 3 ft. above grade) is:

$$(30 - 3) \times \left(\frac{0.840}{2.31}\right) + 14.7 = 24.5 \text{ psia.}$$

Shutoff pressure is 24.5 + 1.20 (220) = 288 psia. (793 ft.).

9. Maximum allowable ΔP. The downstream equipment is good to 300 psig. The maximum allowable ΔP across the pump is thus 300 — 24.5 + 14.7 = 290.2 psi.

10. Special requirements. The requirement of smooth pressure control downstream of these pumps calls for centrifugal-type units. Since the flow must be maintained during a power failure, the regular should be motor driven and the spare turbine driven.

Example 2—Existing pump . . . A 10 by 7½ by 12 duplex reciprocating pump formerly operating at a piston speed of 65 ft. per minute will be available for the service of Example 1 together with a steam source at 180 psig. Assuming that the smooth pressure requirement downstream is relaxed and that the pump is mechanically capable of withstanding the maximum calculated discharge pressure, will this pump be satisfactory?

Design Calculations

1. The calculations of Example 1 are made exactly as before.

2. From the graph and tables of Fig. 1 (installment No. 3, July 13), a 10 by 7½ by 12 duplex unit will pump 270 g.p.m. with a piston speed of 65 ft. per minute. This can also be obtained as follows:

Piston volumetric output per stroke (one direction) =

$$0.786\left[\frac{(7.5)^2\ (12)}{(12)^2\ (12)}\right](7.48) = 2.30 \text{ gal.}$$

S.p.m. = 2 (65) ÷ (12/12) = 130.

G.p.m. allowing for 10 per cent slippage = 2.30 (130) (0.90) = 270 g.p.m.

3. For the requirement of 305 g.p.m., the piston speed must be:

$$\frac{(305)}{(270)}\ (65) = 73.5 \text{ ft. per minute}$$

This value is below the maximum of 90 ft. per minute recommended in Fig. 1 (installment No. 9, August 24) for this size pump. This requirement is therefore satisfied.

4. From the table on Fig. 1 (installment No. 3), for a packed plunger type pump with 200-psig. ΔP and 12-in. stroke, the efficiency is 70 per cent.

5. From the runaround chart on Fig. 1 (installment No. 3), the steam cylinder diameter needed for the conditions of 205-psi. liquid ΔP, 180-psi. steam ΔP, liquid cylinder diameter of 7½ in., and 70 per cent efficiency is 9.5 in.

Hence 10-in. is satisfactory.

6. The maximum discharge pressure of the pump is as follows:

$$\text{Maximum discharge pressure} = \text{maximum suction pressure} + \left(\frac{\text{Steam cyl. diameter}}{\text{Fluid cyl. diameter}}\right)^2 (\text{Steam } \Delta P)$$
$$= 24.5 + \left(\frac{10}{7.5}\right)^2 (180) = 355 \text{ psia.}$$
$$= 340 \text{ psig.}$$

This is the pressure the equipment downstream of the pump must be able to withstand. Since the downstream equipment is only good for 300 psig., a 300-psig. safety valve should be installed on the pump discharge.

7. The 10 by 7½ by 12-in. pump will be satisfactory. (Use of this pump will, however, require another system for controlling the circuit different from that illustrated for service with the centrifugal pump.)

Acknowledgment

The author wishes to acknowledge credit to Standard Oil Development Co. from whose reports figures for this paper were taken, and also appreciation to those whose review and comment have contributed to the accuracy and value of this report.

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*Esso Standard Oil Co., Louisiana Division, Baton Rouge. Excerpt from paper in Chemical Engineering Progress, May 1953, page 235.

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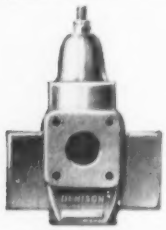

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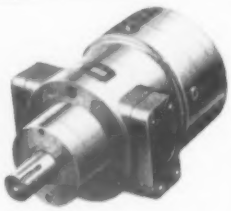

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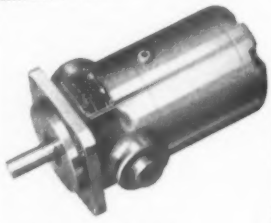

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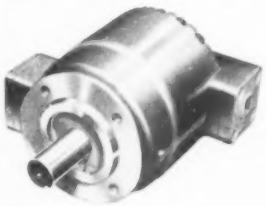

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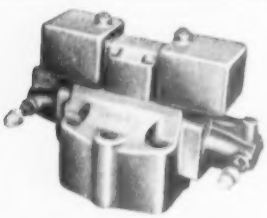

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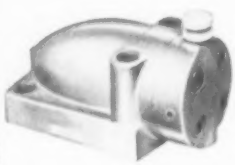

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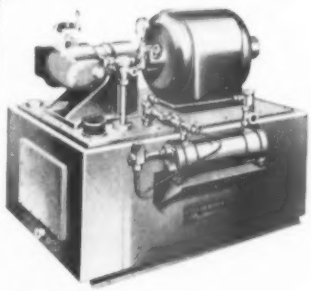

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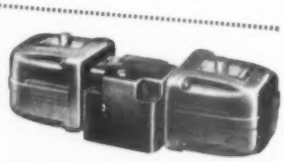

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Part 42 of a series

by Dr. B. E. Lauer, Head, Department of Chemical Engineering, University of Colorado

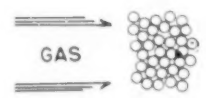
h_f HEAT TRANSFER

COEFFICIENT of HEAT TRANSFER through FILM between GRANULAR SOLID and GAS

Gas Movement: Streamline flow

Shape of granules: Spheres or cylinders

Heat Movement: Heating or Cooling



EQUATION:

$$h_f = 18.1 \left[C_p G\right] \left[\frac{D_p G}{\mu}\right]^{-1} \left[\frac{C_p \mu_f}{K}\right]^{-\frac{2}{3}}$$

TERMINOLOGY:

h_f - Film coefficient of heat transfer, BTU/hr.sq.ft.°F.

C_p - Specific heat of gas at constant pressure, BTU/lb.°F.

G - Mass velocity, lb./hr.sq. ft, Superficial.

D_p - Effective particle diameter

D_p (spheres) = actual diameter

D_p (cylinders) = $\left[D_c H_c + (D_c^2/2)\right]^{\frac{1}{2}}$

D_c = diameter of cylinder

H_c = height of cylinder

μ - Viscosity of gas, lb./hr.ft. μ_f Viscosity at t_f.

K - Thermal conductivity of gas film, BTU/hr.sq.ft.°F./ft. at t_f.

t_f - Average of bulk and surface temperatures.

LIMITATIONS:

Reynolds number ($D_p G/\mu$) less than 40.
Accuracy: ± 3.5%.
0.436 in. > spherical diameter > 0.09 in.
0.740 in. > cylindrical effective diameters > 0.101 in.
400 lb./sq.ft.hr. < Mass velocity, G < 2500 lb./sq.ft.hr.

SIMPLIFIED EQUATION:

If $\mu = \mu_f$ $\quad h_f = 18.1\,(K/D_p)(C_p \mu/K)^{\frac{1}{3}}$

If $(C_p \mu/K)^{\frac{1}{3}} = 0.9$ (true for most gases), $h_f = 16.3\,(K/D_p)$

PHYSICAL CONSTANTS: The values of the physical constants such as density, viscosity and others are reported in the International Critical Tables, in several handbooks, and in the technical literature.

Page references in the Chemical Engineers' Handbook, J. H. Perry (1948) are as follows:

for ρ -- 130-148, 178-195, 1663.
μ -- 370-374, 1198, 1696.
K -- 389-401, 1303, 1697.
C -- 225-235, 297, 1666, 1696.

REFERENCES:

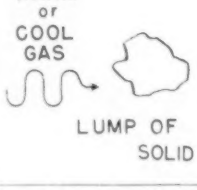
1. H. W. Jamson, G. Thodos, H. A. Bougen, A.I.Ch.E. Trans. 39, 1 (1943).

Q 1,4 b

COEFFICIENT of HEAT TRANSFER through FILM between an IRREGULAR LUMP of SOLID and GAS

Gas Movement: Turbulent

Heat Movement: Heating or Cooling



EQUATION:

$$h_f = 0.33 \frac{K}{D} \left[\frac{DV\rho}{\mu}\right]^{0.6}$$

TERMINOLOGY:

h_f - Film coefficient of heat transfer, BTU/hr.sq.ft.°F.

K - Thermal conductivity of gas at t_f, BTU/hr.sq.ft.°F.

D - Diameter of sphere having same surface as irregular granule.

V - Velocity of gas, ft./hr.

ρ - Density of gas, lb./cu. ft.

μ - Absolute viscosity of gas, lb./ft. hr. at t_f.

t_f - Arithmetic average of bulk and surface temperatures.

LIMITATIONS:

Equation developed for air.

Reynolds number 10,000 to 150,000.

PHYSICAL CONSTANTS:

The values of the physical constants such as density, viscosity and others are reported in the International Critical Tables, in several handbooks, and in the technical literature.

Page references in the Chemical Engineers' Handbook, J. H. Perry (1948) are as follows:

for ρ - 130-148, 178-195, 1663.
μ - 370-374, 1198, 1696.
K - 389-401, 1303, 1697.

REFERENCES:

1. Heat Transmission, William H. McAdams, p. 237.

2. Hartman, I., J. Frank Inst., 215, 593-610 (1934).

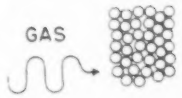
Q 1,4 c (1)

COEFFICIENT of HEAT TRANSFER through FILM between GRANULAR SOLID and GAS

Gas Movement: Forced horizontal flow - turbulent

Shape of granules: Spheres or cylinders

Heat Movement: Heating or Cooling



EQUATION:

$$h_f = 1.064 \left[C_p G\right] \left[\frac{D_p G}{\mu}\right]^{-0.41} \left[\frac{C_p \mu_f}{K}\right]^{-\frac{2}{3}}$$

TERMINOLOGY:

h_f - Film coefficient of heat transfer, BTU/hr.sq.ft.°F.

C_p - Specific heat, BTU/lb.°F.

G - Mass velocity, lb./hr. sq. ft. Superficial - based on cross-section of container.

D_p - Effective particle diameter, ft.

D_p spheres = actual diameter

D_p cylinders = $\left[D_c H_c + (D_c^2/2)\right]^{\frac{1}{2}}$

D_c=diameter of cylinder

H_c = height of cylinder

μ - Viscosity of gas, lb./hr. ft. μ_f- Viscosity at t_f.

K - Thermal conductivity of gas film, BTU/hr.sq.ft.°F./ft. at t_f.

t_f - Designates film conditions (temp. surface + temp. gas (bulk))/2.

LIMITATIONS:

$D_p G/\mu$ > 350
0.436 in. > spherical diameter > 0.09 in.
0.740 in. > cylindrical effective diameters > 0.161 in.
2500 > G > 400
Accuracy - ± 3.5%

PHYSICAL CONSTANTS: The values of the physical constants such as density, viscosity and others are reported in the International Critical Tables, in several handbooks, and in the technical literature.

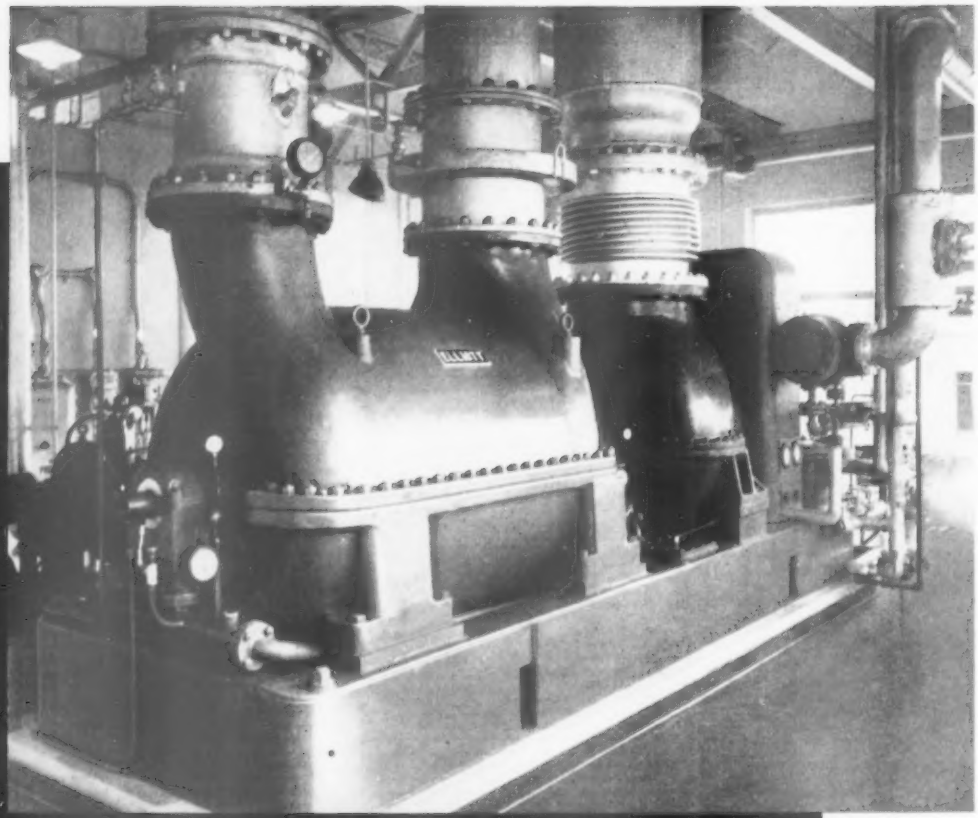
Page references in the Chemical Engineers' Handbook, J. H. Perry (1948) are as follows:

for ρ - 130-148, 178-195, 1666.
K - 389-401, 1303, 1697.
μ - 370-374, 1198, 1696.
C - 225-235, 297, 1666, 1696.

REFERENCES:

1. H. W. Jamson, G. Thodos, H. A. Bougen, A.I.Ch.E. Trans. 39, 1 (1943).

Q 1,4 c (2)



Elliott turbine-driven blower serving cat cracker at the modernized McMurrey Refinery, Tyler, Texas. The blower is rated 16,750 inlet cfm with a 25.5 psi pressure rise. The Elliott 1760-hp condensing steam turbine is direct-connected, operating at 6030 rpm.

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CENTRIFUGAL BLOWER DEPARTMENT

P3-5

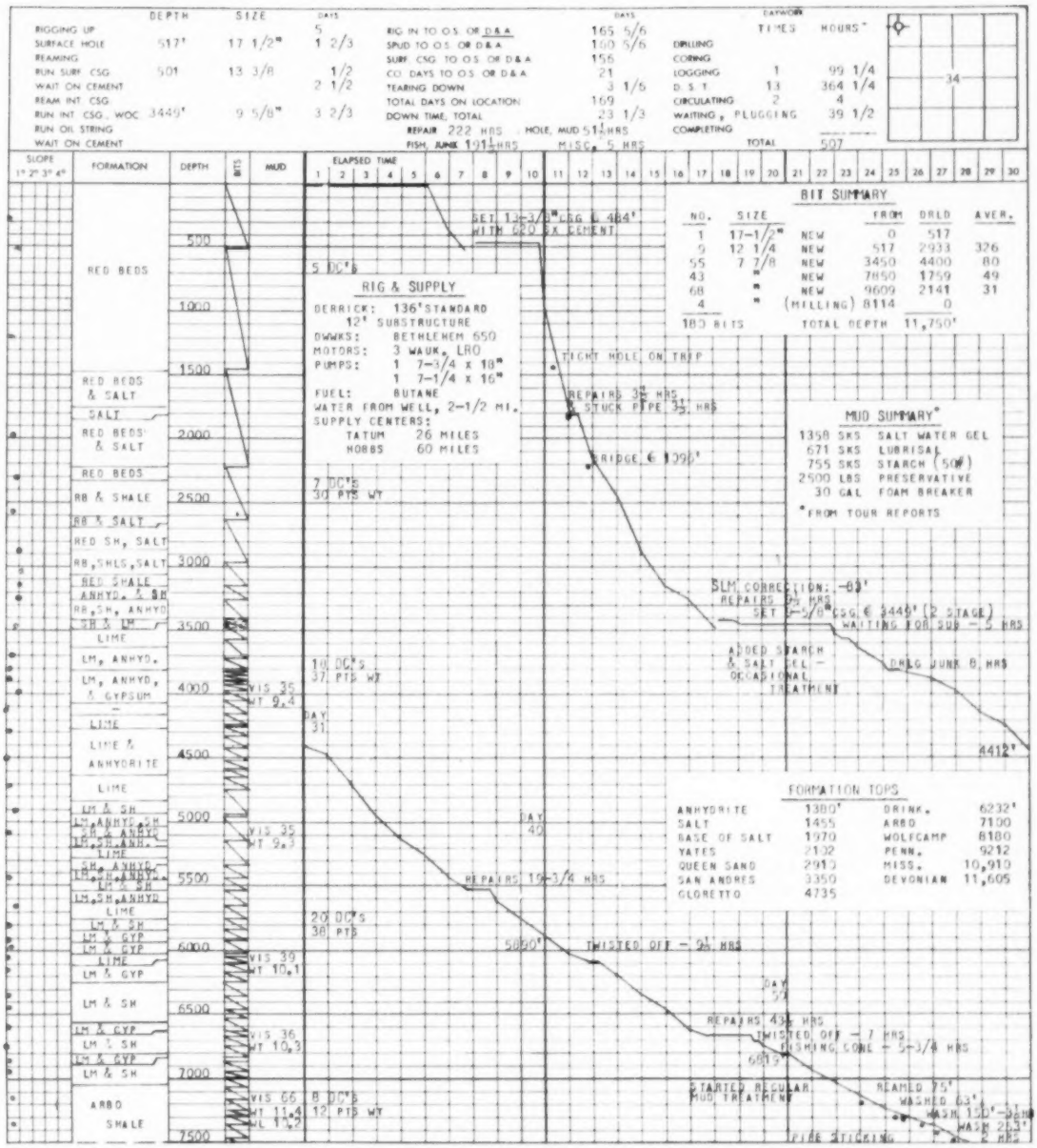
Chaves County (Permian Basin) Drill Log

Contractor: Zephyr Drilling Corp.

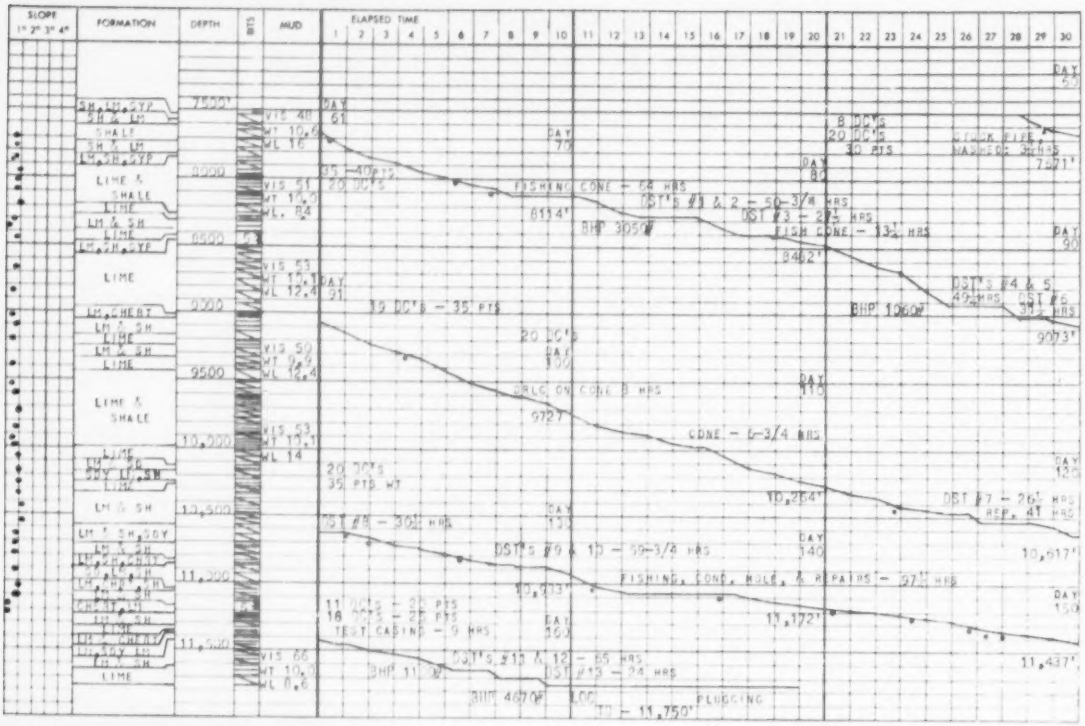
Operator: Stanolind Oil & Gas Co.

Well: 1 Polecat Canyon Unit

Location: 600 ft. north line, 600 ft. west line, 34-10s-31e, Chaves County, New Mexico.



(Compiled for The Oil and Gas Journal by Drilling Data Service, Oklahoma City)



SPECIAL PURPOSE DRILLING MUD*

Sodium Silicate—Brine Drilling Mud

SODIUM silicate drilling muds are a special type of chemical mud used primarily for the drilling of sloughing shale zones, difficult high-pressure salt-water flows, and other particularly troublesome formations. Their purpose is to provide a mud which is not flocculated or otherwise adversely affected by contamination, and which prevents the hydrous disintegration of even the most colloidal shales encountered in drilling. The liquid phase of a silicate mud is a water solution containing a relatively high concentration of a special silicate of soda and salt. It weighs approximately 11.8 lb. per gallon and has the consistency of a thin syrup.

The silicate of soda used in preparing these muds has a chemical ratio of 1 part of NA_2O to 2 parts of Si_2O. This material is available commercially as an anhydrous powder and as a 50° Be. liquid containing 43.5 per cent by weight silicate of soda solids.

The following are typical formulas for preparing 1 bbl. of silicate-brine mud with a liquid phase containing 47.6 gm. of silicate and 11 gm. of salt per 100 cc.:

FORMULATION USING ANHYDROUS POWDERED SILICATE OF SODA

12 lb. Per Gal. Silicate-Brine Mud

155 lb. powdered silicate of soda.
36 lb. salt.
15 lb. high-yield drilling clay.
0 lb. barite.
0.82 bbl. water.

17.6 lb. per gal. silicate-brine mud.

128 lb. powdered silicate of soda.
29 lb. salt.
8 lb. high-yield drilling clay.
351 lb. barite.
0.63 bbl. water.

FORMULATION USING 50° Be. LIQUID SILICATE OF SODA

12 lb. Per Gal. Silicate-Brine Mud

338 lb. liquid silicate of soda.
36 lb. salt.
16 lb. high-yield drilling clay.
0 lb. barite.
0.274 bbl. water.

17.6 lb. per gal. silicate-brine mud.

279 lb. liquid silicate of soda.
29 lb. salt.
8 lb. high-yield drilling clay.
351 lb. barite
0.179 bbl. water.

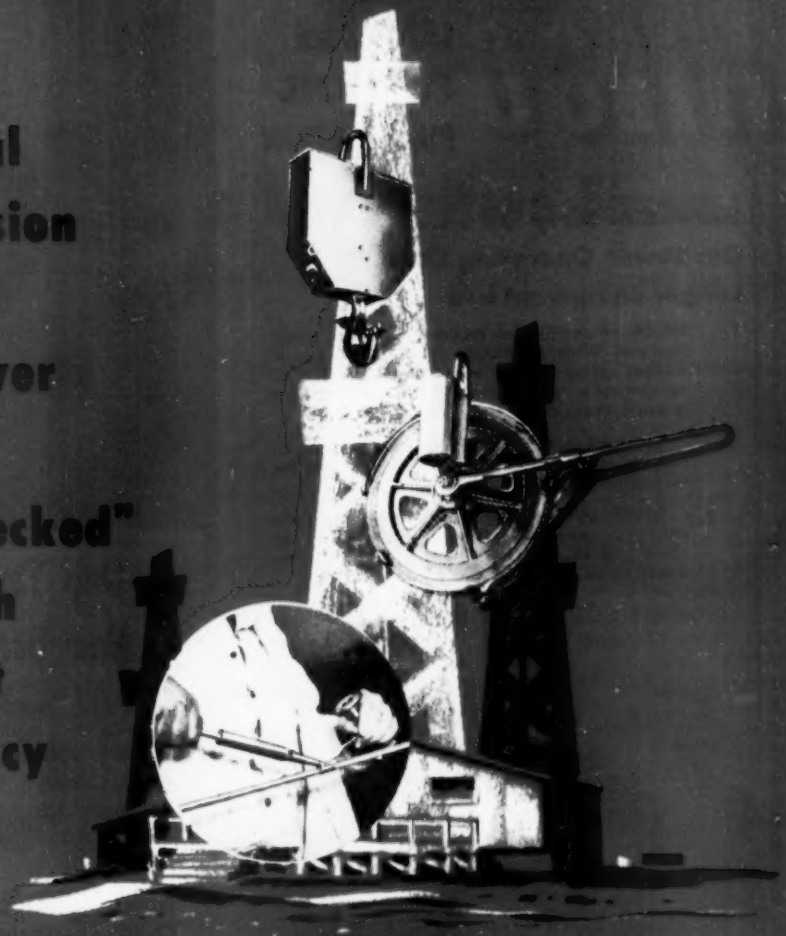
Bentonite and clay added to this mud do not swell as they do in ordinary water-base muds, but they can be mechanically dispersed to give the desired viscosity and suspending properties. Barite can be added to these muds to increase the weight in the same way as in ordinary muds. Treating chemicals such as caustic soda, quebracho, phosphates, etc., have no effect upon silicate muds. Such muds are not subject to flocculation by salt, calcium, and other contaminants, and they are not thinned by deflocculating agents. The control of the physical properties of a silicate mud is accomplished by dilution with the silicate-salt liquid phase for thinning, and by increasing the colloidal solids concentration with clays for thickening. The only type of contamination that seriously affects a silicate mud is ordinary fresh-water mud or previously hydrated colloidal shale or clays. The addition of hydrated colloidal material increases the gel tain the viscosity and gel strength.

From time to time it is necessary to increase the volume to fill the new hole drilled. This new mud is made according to the above formula except that no clay is added. The dilution resulting from the new mud is usually sufficient to main-strength of silicate mud.

The physical properties of silicate mud remain quite stable while drilling, because cuttings from the formation are not disintegrated, and they arrive at the surface having the appearance of bit-marked shavings which are easily removed by the shale screen.

*Taken from Principles of Drilling Mud Control, Industrial and Business Training Bureau, University of Texas.

it takes real precision instruments to deliver Lane-Wells "triple-checked" depth measurement accuracy



It may be a little difficult to think of cables and sheaves as "precision instruments," but those used in Lane-Wells perforating are just that — for the following reasons:

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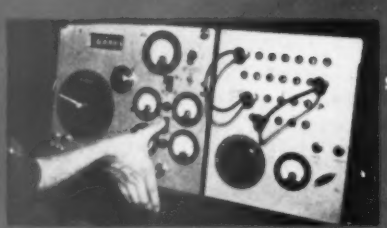

Each **measuring sheave** over which the cable runs has a built-in micrometer adjustment to compensate for even the slightest wear, guaranteeing continuous accuracy of the rim of the sheave.

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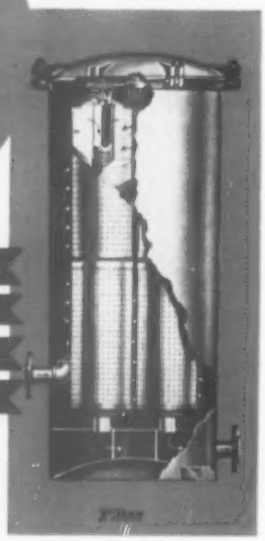

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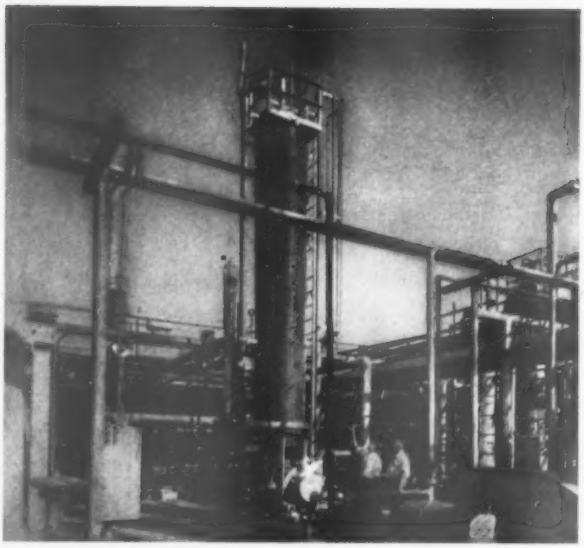

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PETROLEUM SERVICE DIVISION

SIZING CONTROL VALVES—7

What Tests on Flashing Liquids Have Shown

- Globe bodies . . . apparent critical pressure ratio is dependent on heat content of water only.
- Angle bodies . . . no comprehensive method for sizing was discovered.

FROM the curves obtained with angle-body tests (Installment No. 6, August 24), it is evident that it is not possible to consolidate the angle-body test results into any general sizing rule that would be practical.

While the angle-style bodies have quite high C_v's or flow coefficients, due to the fact that their allowable pressure-drop factor or point of critical pressure drop is so low, their actual capacity is considerably less than that for globe bodies at high pressure drops and temperatures near saturation.

Tests were also run with angle bodies installed so that the direction of fluid flow tended to open the inner valve. Results indicated that critical pressure ratios with this method of installation were almost identical to those for globe bodies. Capacities were also equal to those of globe bodies. Double-ported angle bodies were not tested, inasmuch as they are not widely used.

Conclusions

The quantity of liquid flow through an orifice of a control valve is a function of the pressure drop or the difference between entrance and exit static pressures.

The maximum attainable inlet pressure is determined by such factors as elevation, pumping equipment, etc. The minimum attainable orifice outlet pressure is the vapor pressure of the liquid at the flowing temperature. Since the static pressure decreases with increasing velocity, it is logical to assume that at some pressure drop, the increased velocity at the valve orifice exit will result in a static pressure equal to the vapor pressure of the liquid. When this condition of vapor pressure in the region of the valve orifice has been reached, the valve orifice is passing its maximum capacity for the given inlet pressure and flowing temperature, and further reduction in static pressure in the downstream piping will not result in increased flow. The pressure drop at which this phenomenon takes place has been referred to in this paper as an apparent critical pressure drop.

Enthalpy . . . Because the vapor pressure of a liquid is a function of its temperature or enthalpy, it seems logical that enthalpy might be considered as a factor in determining capacities of control valves handling liquids.

Exhaustive tests have shown that for all practical purposes apparent critical pressure ratios for single or double-ported globe bodies with plug-type or V-port inner valves handling water are dependent on heat content of the water only and can be predicted with reasonable accuracy. A method based on this fact of accurately sizing control valves handling water has been presented.

Angle-style bodies . . . When installed in the conventional manner with flow tending to close the inner valves these have been found to have considerably lower apparent critical pressure ratios than globe bodies, and consequently, less capacity at higher pressure drops and temperatures. This is probably due to less turbulence and increased orifice exit velocity. Actual apparent critical pressure ratios were dependent on body size, details of body and orifice designs, and ratio of body to orifice size. No comprehensive method of sizing angle bodies was discovered.

It is the recommendation of the authors that angle bodies should be used with caution unless they are installed in reverse of the conventional manner, so that flow tends to open the inner valves. If installed in this manner, they can be sized by the same methods used on globe valves and will have essentially the same capacities.

The data and conclusions presented in this paper apply only to water, but it is resonable to assume that similar data on other liquids would lead to similar conclusions. From this it appears that in order to intelligently size a control valve handling liquid, the vapor pressure of the liquid should be considered, as well as inlet and outlet pressures, temperature, viscosity, specific gravity and required rate of flow.

NEXT . . .

Pipe-Line Control Valves

What is involved in pipe-line control-valve application will be the topic of the next series to appear in an early issue on the Instruments page. This new series will deal first with air-operated diaphragm motor-control valves installed in the discharge of electric centrifugal booster pumping stations for pressure-control service on closed-loop crude-oil pipe lines.

For such valves there are two basic requirements: (1) a minimum pressure drop in the open position and (2) ability to respond smoothly to all control demands, both major and minor. Valves commonly in use today represent a compromise on these two requirements.

In a later installment, the use of double-ported control valves on natural-gas service in larger sizes, previously not considered practical, will be discussed.

*Fisher Governor Co. Presented at Symposium on Instrumentation, A. & M. College of Texas, 1953.

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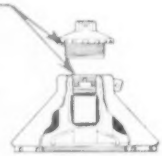

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Asphalt for Roofing Materials—2

by W. L. Nelson
Technical Editor

Last week W.M.W. asked about the properties of roofing asphalts. Tables of the specifications and properties of roll-roofing saturants and of mopping asphalts were presented. Herein, the properties of shingle saturants (Table 3) and Coating Asphalts (Table 4) are shown, and the desirable properties of roofing asphalts are discussed.

In general, all roofing asphalts should have flash points 50° F. above the application temperatures or better yet, 500° F. They should not foam during heating or the saturating or coating operations because foam tends to cause breaks in the surface. Obviously, the several kinds of asphalt employed in fabricating or building-up a roof should be compatible with one another. Oil should not be liberated nor should the basic properties be altered by contact with other asphalts.

The two basic requirements of a roofing material are resistance to the weather and ability to seal out water. The U. S. Bureau of Standards' accelerated weathering test (Strieter, O. G., Tech. Paper 197, Bur. of Stds. Journal of Research V, p. 247) insures that changes in temperature, the action of the sun's rays, and the effects of moisture will not cause the asphalt to harden or become brittle. Likewise, the asphalt must not absorb water. If the slope of the roof exceeds 1 in. per foot, the water absorption should not exceed 5 g. per square foot area during one-half year. Even less absorption (2.5 g.) is permitted for flatter roofs.

Saturating asphalts . . . These, either for saturating shingle or roll roofing, must have sufficient fluidity (lack of viscosity) at 350°-450° F. to wet the felt fibers and soak into the pores before the fibers are injured by the heat. Roll-roofing saturants must be soft (penetration at 77° F. of 50-150) and flexible enough not to crack when unrolled but if they are too soft they will bleed or flow. Saturants for shingles are harder so that the shingles are not lifted or broken during high winds. Saturants should have a high solubility in carbon tetrachloride so that the pores of the fibers are not plugged.

Coating asphalts . . . These must have a good temperature susceptibility so that they are not brittle or cheesy at low temperatures, nor soft or showing a tendency to flow at elevated temperatures. They should, of course, have nearly the same coefficient of expansion as the saturated felt. Some adjustment can be made in the coefficient by the addition of mineral (stabilizer) matter. Pliability or flexibility is insured by the Reeve and Yeager Pliability Test (Proc. A.S.T.M., XXV, II, page 385) in which the coating must bend through 90° without cracking.

Mopping asphalts . . . These are used entirely for buildup roof constructions and hence they must have good flow properties at 400°-475° F., so that they will smooth or level themselves. They must adhere to the layers of felt so that blisters, caused by entrapped air, do not occur.

TABLE 3—ASPHALT SATURATES FOR SHINGLES

	A.S.T.M.	Range sold
Specific gravity at 60° F.	1.0-1.04	1.007-1.039
Softening point, (R & B)	145-165	143-164
Penetration at:		
32° F., 200 g., 60 sec.	10 up	9-22
77° F., 100 g., 5 sec.	25-40	27-43
115° F., 50 g., 5 sec.	Under 115	82-138
Ductility at 77° F.	10 cm. up	7-110
Flash point (C.O.C.)	475 up	435-635
Fire point (C.O.C.)		470-715
Loss — 5 hours at 325° F.	Under 0.5%	Trace — 0.5%
Loss in penetration after heating	Under 20%	3.3-10.3
Soluble in carbon tetrachloride	99 up	99.8-99.9
Soluble in 86° Be. naphtha		65.8-80.7
Viscosity at:		
350° F.	Under 140 Furol	52-115 Stormer*
400° F.	Under 60 Furol	21-46 Stormer*
450° F.	Under 30 Furol	13-26 Stormer*
Foam test—Sec. for first clear spot	Under 300	62-245
Compatibility with coating at 130° F. for 72 hours	Under 0.3 mm.	
Oliensis heterogeneity test after 24 hours	Negative	Negative

*100 g. 100 rev.

TABLE 4—COATING ASPHALTS

	A.S.T.M.	Range sold
Specific gravity at 60° F.	1.005-1.045	1.007-1.036
Softening point, (R & B)	215-240	208-230
Penetration at:		
32° F., 200 g., 60 sec.	10 up	10-16
77° F., 100 g., 5 sec.	18-22	16-22
115° F., 50 g., 5 sec.	Under 45	28-36
Ductility at 77° F.	Over 2.5 cm.	1.5-3
Flash point (C.O.C.)	Over 475° F.	470-625
Fire point (C.O.C.)		535-685
Loss — 5 hours at 325° F.	Under 0.5%	None — 0.2
Loss in penetration after heating	Under 20%	None — 18.8
Impact at 40° F. (inches)	Over 2 in.	1.2-3.3
Pliability at 40° F.*		25-180
Soluble in carbon tetrachloride		99.7-99.9
Soluble in 86° Be. naphtha		62-66.4
Stain test, 130° F., 5 days†	Under 3½	2-4½
Viscosity, Stormer 100 g., 100 rev. Sec. at:		
375° F.		134-500
400° F.		73-205
425° F.		40-122
450° F.		25-73
Compatibility with saturants at 130° F., 72 hours:		
Roll saturant	Under 1.5 mm.	
Shingle saturant	Under 3 mm.	
Accelerated weathering cycles to failure‡		35-135
Photosensitivity index		0.8-3.0

*Reeve & Yeager "Machine for . . . Pliability . . .," Proc. A.S.T.M., II, 385 (1925). †Barber Method, "Determination of the Stain Number of Asphalts," Ind. Eng. Chem., Anal. Ed. IX, 563. ‡Strieter, O. G., "Accelerated Tests of Asphalt," R.P.197, Bur. Stds. J. Research V, 247 (1930).

EQUIPMENT MEN . . . in the News

Lane-Wells Announces Two Executive Appointments

In line with the tremendous growth in business volume of Lane-Wells Co., two important new executive appointments, effective October 1, 1953, have been announced by Rodney S. Durkee, president.

John J. Neale formerly Lane-Wells

J. J. NEALE

HENDERSON

Gulf Coast division manager, has been made assistant to the president. Joseph M. Henderson, formerly assistant Gulf Coast division manager, has been advanced to the post of Gulf Coast division manager.

Neale, a graduate of Texas A. & M., started with Lane-Wells in 1936 as a loader. He successively served as gun perforator operator, subdistrict superintendent, division sales engineer, district superintendent, division sales manager, and Gulf Coast division manager, directing the activities of that division and 40 branches in that area. His new headquarters will be in Los Angeles.

Henderson, also a graduate of Texas A. & M., joined Lane-Wells in 1936. He has served as loader, rigman and operator, subdistrict and district superintendent, assistant to the Gulf Coast division manager, and assistant Gulf Coast division manager.

C. O. Martin to Handle New Attapulgus Gelling Agent

Attapulgus Minerals & Chemicals Corp. has announced the assignment of C. O. Martin to sales and technical service activities in connection with Permagel, the company's new thickening agent for organic and aqueous media.

Martin has been closely associated for the last 5 years with laboratory development and application research work on Permagel, particularly in the lubricating-grease field. Martin holds a bachelor's degree in chemical engineering from University of Pennsylvania, from which he was graduated in 1948.

Martin-Decker Appoints Two Service Engineers

Frank Kelso and John Tatum have been appointed Oklahoma and West Texas service engineers for Martin-Decker Corp., and they will be headquartered in Oklahoma City and Odessa, Tex., respectively.

Kelso is being transferred to the Oklahoma area after a year's service with Martin-Decker at Odessa. In his new duties he will be working with E. M. (Mutt) Donovan, Mid-Continent sales engineer with headquarters at Oklahoma City.

Tatum joins the company with oilfield and instrument repair experience gained from Snyder Co., Reed Roller Bit Co., and Republic Supply Co., all of Odessa. He will be working with Carroll Kelso, sales engineer in West Texas and New Mexico.

New Giant-Size Hole Opener Added to H. C. Smith Line

The 36-in., 3-point hole opener is one of the largest ever built. It is a new addition to the line of 3-point and 6-point hole openers manufactured by H. C. Smith Oil Tool Co. of Compton, Calif. H. C. Smith, president of the company, holds up one of the company's regular 37⅛-in., 4-cutter bits to emphasize dimensions of the new giant. Like all other hole openers in H. C. Smith line, the 36-in. hole opener is supplied with either a bull-nose pilot bit, as shown, or with a rock bit pilot.

BJ Offers Educational Film on Mechanical Seals

Byron Jackson Co. has recently completed a full-color educational film describing the theory, purpose, use, construction and maintenance of mechanical seals. This factual film is available for showing to company engineering and maintenance meetings through L. O. Kimball, Byron Jackson Co., Los Angeles.

Jones Appointed Chief Engineer by Axelson

D. M. JONES

Douglas M. Jones, formerly assistant chief engineer and technical consultant, has been appointed chief engineer of Axelson Manufacturing Co., division of Pressed Steel Car Co., Inc., according to an announcement made by W. W. Greenway, vice president of Pressed Steel Car, and general manager of Axelson. Jones succeeds Glynn H. Williams, who has been advanced to a special production engineering post.

Jones has been with Axelson since 1936. For 6 years prior to joining Axelson he was with E. M. Smith Co. Jones is well known both nationally and in foreign production offices for his technical writings and development of methods relative to engineering of sucker-rod pumping installations.

Johnston Promotes Lundie To Executive Position

Kenneth G. Lundie, vice president in charge of sales for the Johnston Pump Co., of Pasadena, Calif., has been elected president of Johnston Pump Co. of New Mexico, and Johnston Pump Co. of Fresno, Calif., it was announced recently by the parent organization.

Lundie has been active for over 30 years in such fields as merchandising, sales promotion, sales management, and distribution of pumps.

Johnston Pump Co. of New Mexico and Johnston Pump Co. of Fresno assemble, distribute, service, repair, and maintain pumps for agriculture, industry, and water supply.

Century Geophysical Forms Century Drilling Corp.

Formation of Century Drilling Corp. has been announced by Ben F. Rummerfield, vice president of Century Geophysical Corp., Tulsa.

Rayburn Drilling Co., a seismic shothole drilling company, was purchased by Century, and Floyd H. Rayburn, president of the former company, will manage the new drilling company as supervisor of drilling operations.

Century Drilling Corp. is operating shot hole drills in New Mexico, Wyoming, North Dakota, Montana, and Texas.

Officers of Century Drilling are: Opie Dimmick, president; Ben F. Rummerfield, executive vice president; David R. Weichert, vice president; and James B. Bender, secretary-treasurer.

Enterprise Opens Two New Sales and Service Offices

Paul I. Birchard, vice president and general manager of Enterprise division, General Metals Corp., has announced two new sales and service offices to handle engine business.

In Denver and the Rocky Mountain

P. E. GRIFFIN

S. F. ATSATT

area, Percy Griffin heads up the new office. The complete line of engines

H. GOODWIN

H. T. ANDERSON

will be his charge with special emphasis on oil-field applications.

In Minneapolis Stewart F. Atsatt will set up a complete sales and service outlet for Enterprise line of diesel engines.

Hugh Goodwin becomes manager of New York Enterprise branch office, as H. T. Anderson returns to San Francisco as assistant general sales manager under Birchard.

Manufacturer's Representatives Attend Conoflow Sales Meet

Conoflow Corp., Philadelphia manufacturers of final control elements, recently held a 3-day sales-engineering conference for its manufacturers representatives at the company's main offices in Philadelphia, which was directed by John C. Koch, vice president in charge of sales. Representatives attending were, standing: Donald Davie, H. H. Barnum Co., Detroit; Paul Henke, National Engineering Co., Indianapolis; David Hall, W. M. Wilson Co., Pittsburgh; James B. Madison, sales engineer, Conoflow Corp.; John C. Koch, vice president in charge of sales, Conoflow; Morley Hudson, Hudson-Rush Co., Shreveport; and M. Mark Watkins, vice president and treasurer, Conoflow. Seated, back row: O. D. McEnderfer, King Gage Engineering Co., Newton Center, Mass.; Eugene Leeland, Instrument Sales Co., Seattle, Wash.; Bernard Bremmer, H. G. Jones Co., Pittsburgh; Bruce Greaves, Bruce Greaves Co., St. Louis; Glynn Thomas, Equipment Sales Co., Chatanooga; and C. P. Boyd, Cyberno Products Co., Philadelphia. Seated, first row: Al Hatcher, O. R. Lawrence Co., Glens Falls, N. Y.; Jack Lawrence, O. R. Lawrence Co., Buffalo, N. Y.; Jack Rush, Hudson-Rush Co., Dallas; Roy Myers, E. Roy Myers Co., Cincinnati.

Leschen Appoints Dickson General Sales Manager

Russell J. Dickson has been appointed general sales manager, Leschen Wire Rope Division of H. K. Porter Co., Inc., St. Louis, it has been announced by D. W. Vernon, vice president and general manager.

R. J. DICKSON

Dickson will be in charge of the company's sales activities. He has been with Leschen for more than 3 years as Chicago district manager. His entire business experience has been in the wire-rope industry.

Elliott Elected President Acme Fishing Tool Co.

Acme Fishing Tool Co. recently announced the election of Karl L. Elliott as president. Elliott has been connected with Acme since 1919, and has been vice president of sales in recent years.

Walter P. McKain has been selected as vice president of operations. McKain has been chief engineer of the company since 1936, and in recent years has also been general superintendent.

Herschel C. Battin has been selected as treasurer and assistant treasurer of the parent Stardrill-Keystone Co. Battin has been in charge of Acme's accounting department since 1951.

Lewis M. Ludlow, who has been president of Acme since 1918, has retired from the active management of Acme Tool. Ludlow is a pioneer in the cable-tool manufacturing industry, who has built Acme's operations into one of the foremost companies in the field.

On June 1, 1953 Acme Fishing Tool Co. became a division of Stardrill-Keystone Co., manufacturer of drilling machines and tools since 1882.

International Harvester Announces New Division

International Harvester Co., Chicago, has established an industrial power division sales department, it was announced recently by H. T. Reishus, vice president, industrial power division.

At the same time Reishus announced the appointment of I. P. Payne as manager of the new industrial power sales department. Payne has been associated with the sale of I.H. industrial power products since 1937 when he became an industrial salesman at Harvester's New Orleans, district sales office. Since that time he has served as assistant district manager, Atlanta; district sales manager at Houston; and regional sales manager in charge of industrial power sales for the southwest region, Chicago. In March 1949 he was appointed assistant manager, gen-

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Midland, Texas
Casper, Wyoming
Edmonton, Alberta, Canada

EXPORT OFFICE
New York City

WAREHOUSES
Lancaster, Ohio
Wichita Falls, Texas
Houston, Texas
Odessa, Texas
Casper, Wyoming
Edmonton, Alberta, Canada

eral sales, specializing in the administration of the company's industrial power sales and served in that capacity up to this time.

Assisting Payne will be W. M. Holland and C. E. Jones, who have been appointed assistant manager of sales, industrial power division.

Three Appointments Named By Johnston Testers, Inc.

N. K. ANDREW

Norman K. Andrew, chief engineer for Johnston Testers, Inc., has moved from Los Angeles to Houston. H. J. Quintrell has been appointed superintendent of manufacturing for Johnston Testers, and will direct the activities of both the Houston and Los Angeles plants. T. L. Long has been promoted to manager of perforating.

Andrew has been with Johnston companies since 1939, and is well known in the Mid-Continent, Rocky

QUINTRELL

T. L. LONG

Mountain areas, and Canada where he has spent considerable time on field engineering problems and research.

Quintrell was previously foreman of Johnston's Los Angeles manufacturing plant. He came to Johnston in 1945 from Lane-Wells Co.

Prior to his promotion Long was in research and development, and earlier was machine-shop foreman. He has been with Johnston for 17 years in Houston.

Harris Joins McEvoy As Houston City Salesman

McEvoy Co., of Houston, has recently announced the appointment of Jack W. Harris as city salesman. Harris came to McEvoy from Cameron Iron Works, Inc., where he was assistant sales manager in charge of industrial valve division.

As city salesman for McEvoy, Harris will specialize in sales and engineering problems pertaining to the new McEvoy A.S.A. line of valves.

Continental Names Gailus Manager, Tubular Division

Joseph T. Gailus has been appointed manager, tubular division, of The Continental Supply Co.'s sales department in Dallas. Gailus, who since June 1948 has been manager of tubular sales for Continental's Kansas - Oklahoma division, assumed his duties August 15.

Gailus was transferred to Continental in August 1939 from The Youngstown Sheet & Tube Co. where he had been assistant foreman of the seamless mill, Houston; he later moved to Dallas to a position in the pipe department. His prior steel experience included employment with Carnegie Illinois Steel Corp.

Purdum Returns From Engineering Trip to Kuwait

Frank Purdum, owner of Subsurface Engineering Co., and a partner in Wright Petroleum Laboratories, Tulsa, has recently returned to Tulsa from a trip to Kuwait, Persian Gulf.

Purdum left Tulsa on June 3, 1953, to do special engineering work for American Independent Oil Co., San Francisco, on its discovery well, 4 Wafra, in Kuwait.

Ralph Neuhaus Named Vice President, General Manager

R. NEUHAUS

Ralph Neuhaus, prominent industrial executive, has been named vice president and general manager of Associated Oil Field Rentals.

Neuhaus' appointment was announced by David C. Bintliff, chairman of the board, who also said that the properties and oil-field-rental business formerly operated under three separate companies, Associated Oil Field Rentals of Houston, Southwest Pipe Rentals of Oklahoma City, and Drill Pipe Rentals of Odessa, hereafter would be operated under the trade name of "Associated Oil Field Rentals."

The firm supplies oil producers and contractors with items such as odd-size drill pipe, drill collars, kelly joints, blowout preventers, drive bushings,

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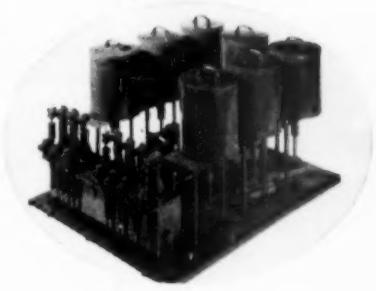

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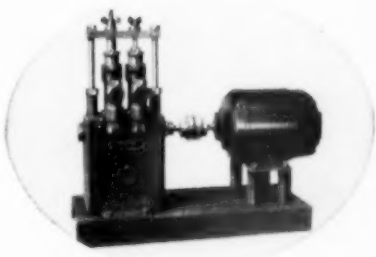

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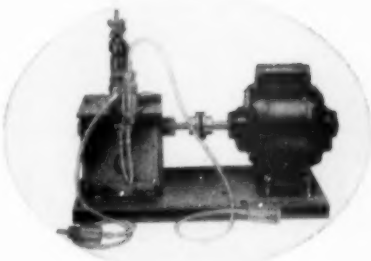

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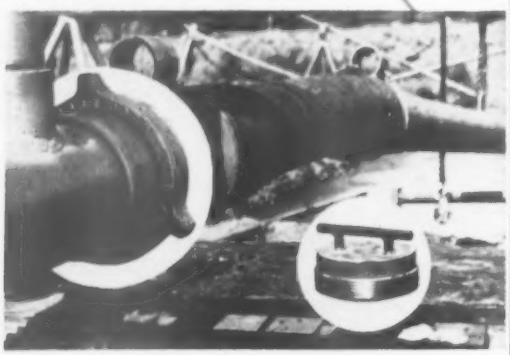

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WECO Unions from Fig. 200 through Fig. 1502 are steel forgings or steel castings. The WECO Fig. 100 Union (1,000 psi Test) is made of highest quality certified malleable iron.

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Manufacturers and Distributors of Oilfield, Refining, Marine and Industrial Equipment

slips, elevators, tongs, and many other oil-field items on a rental basis.

O. L. Dorroh is vice president and operating manager of the company. James A. Gray, Rex Hudson, and Cecil DeArman will continue on the board of directors.

Neuhaus has been identified with the oil-tool industry for 30 years. A graduate of Cornell University, he was with Hughes Tool Co. for 16 years where he served as chief engineer. For 4 years during World War II he was in charge of the Hughes Strut Plant. More recently he has been sales manager for Cameron Iron Works.

Offices and rental yards of the firm are located in Houston; Harvey, La.; New Iberia, La.; Shreveport; Casper, Wyo.; Williston, N. D.; Oklahoma City; Alice, Tex.; and Hobbs, N. M.

Vinson Announces New Coil Slitting Service

F. W. BUSH

Vinson Supply Co., Tulsa, will soon offer a metal coil slitting service at its Dallas warehouse to serve metals fabricators in southern Oklahoma and Texas. This is the first such service available to this area, according to Joe McReynolds, vice president and general manager of the refinery and metals supply firm.

To set up and manage this new department, Fred W. Bush has joined the Vinson Dallas branch. Bush came to Vinson from W. J. Holliday & Co., steel warehousing firm in Indianapolis, where he was manager of the company's sheet and strip department. He has 23 years of experience in the steel industry, having began his steel career with Pittsburgh Steel Co., in Pittsburgh.

Robinson is New Manager Of Stores for Bethlehem

New manager of stores for Bethlehem Supply Co. is H. W. (Robbie) Robinson, following his appointment by Wendell Jones, Bethlehem Supply vice president. He replaces M. A. (Max) Klepfer who has been assigned special sales work for the company.

Robinson has served the company in every one of Bethlehem Supply's California stores since he joined the company in 1934. He also organized and operated the company's sales office and warehouse in Seattle during World War II.

Pipe-Line Construction

PIPE-LINE activity as reported below by The Oil and Gas Journal is compiled from information received from pipe-line companies and contracting firms.

These projects include those planned, proposed, under way, and contracted. Uncontracted projects are indicated by a • preceding the company name.

Crude-Oil Pipe Lines

• **California - Oregon Pipe Line System**—103 miles 6-in., proposed, Crescent City, Calif., to Medford, Ore.

• **R. A. Goodall.**—45 miles, 6-in., planned, Little Beaver to Merino, Colo. (To connect with Sterling system).

• **Gulf Refining Co.**—55 miles, 12-in., planned. Bay Marchand to Plaquemines, La.

Humble Pipe Line Co.—71 miles, 16-18-in., under way, East Texas to Louisiana - Texas border. (30 miles of 16-in., and 41 miles of 18-in.) O. R. Burden Const. Corp. Completion date 10-53.

40 miles, 18-in., under way Longview to Louisiana border. Panama Williams.

Interstate Oil Pipe Line Co.—107 miles, 22-in., under way, Shreveport to Baton Rouge, La. River Construction Corp. 10-15.

55 miles, 16-in., under way, Raceland to Anchorage, La. L. E. Farley.

Plaquemine to Anchorage, La.

Lakehead Pipe Line Co.—635 miles, 30-in., under way, Superior, Wis., to Sarnia, Ontario, Canada. Project managed by Bechtel Corp., Saginaw, Mich.

Superior to Wisconsin-Michigan state line. Mahoney Contr.

Under way, Michigan - Wisconsin State line through Crystal Falls to Cooks, Mich. Anderson Bros. 9-15-53.

Cooks to St. Ignace, Mich., on Straits of Mackinac. Midwestern Constructors, Inc.

Mackinaw City to Red Oak, Mich. Bechtel Corp.

Red Oak via Bay City to International Boundary south of Port Huron on St. Clair River. Conyes Const.

Water crossings of Mackinaw, Saginaw, and St. Clair rivers, Merritt-Chapman & Scott Corp., W. J. Meagher & Sons, Inc., and Midwestern Constructors.

• **Magnolia Pipe Line Co.**—29 miles, 8-in., planned. Midland County, Texas area.

Magnolia Pipe Line Co.—154 miles 16-in., under way, Corsicana to Ringgold, Tex. H. B. Zachry.

Michi, Inc.—10-in., planned, Highland, Ind. to Kalamazoo, Alma, and Elsie, Mich.

• **Pasotex Pipe Line Co.**—146 miles, 10-in., planned. Snyder to Wink, Tex.

Phillips Pipe Line Co.—26 miles, 8-in., under way, northeast area of Andrews County, Texas.

18 miles, under way, gathering lines, northeast area of Andrews County, Texas.

• **Progress Pacific Pipeline Co.**—1,100 miles, 24-in., planned, Odessa, Tex., to Los Angeles, Harbor, Calif.

• **Roosevelt Oil & Refining Corp.**—22 miles, 4 and 6-in., planned St. Helen to Norwich, Mich.

Service Pipe Line Co.—153 miles, 12-16-in., under way, Tioga-Beaver Lodge area to Mandan, N. D. O. R. Burden Const. Corp.

55 miles, 4-6-8-in., under way, Tioga-Beaver Lodge area gathering system. C. P. Bartley & Son.

Texas New Mexico Pipe Line Co.—52 miles, 10-in., contracted, Dawson County to Basin System, McVean & Barlow.

Texas Pipe Line Co.—34 miles, 6-in., under way, Sour Lake to Port Arthur, Tex. Houston Contracting.

45 miles, 8-10-in., under way, between Erath and Bayou Sale stations. Houston Contracting Co.

• **West Coast Pipeline Co.**—960 miles, 20-22-in., planned, Wink, Tex., to Norwalk, Calif.

Products Pipe Lines

Augusta Pipe Line Co.—43 miles, 8-in., under way, from Arkansas City to Augusta, Kans. Ray L. Smith & Son, Inc.

• **H. W. Bass & Sons, Inc.**—152 miles, 4-6-in., proposed. Duval and Live Oak counties, Texas, to Corpus Christi, Tex.

Buckeye Pipe Line Co.—370 miles, 10-14-16-in., under way, Linden, N. J., via Allentown, Pa., to Auburn, Syracuse, Waterloo, and Rochester, N. Y. 9-53.

Guthsville to Dupont, Pa. Pipe Line Const. & Drilling Co.

Dupont north to Pennsylvania-New York state line. Fulghum Contr. Corp.

Pennsylvania-New York state line to Auburn, N. Y. Williams-Austin.

Auburn to Syracuse, N. Y. Williams-Austin.

Auburn to Caledonia, N. Y. Universal Map and Survey Co.

Evangeline Products System (Texas Pipeline Co., Gulf Refining Co., Sinclair Pipe Line Co.)—196 miles, 16-in., under way, Port Arthur, Tex., to Baton Rouge, La. Panama-Williams Corp. (line and crossings.) J. Ray McDermott Co., Inc., collaborates in crossings.

• **Great Lakes Pipe Line Co.**—Proposed, extension 130 miles, Nebraska City to Grand Island, Neb.

Harbor Products Systems—86 miles, 16-in., under way, Woodbury Junction, Philadelphia to Trembley Point, N. J. Construction Service Co. and H. C. Price Co. (Joint ownership of Sinclair Pipe Line Co., Gulf Refining Co., and Texas Pipe Line Co.)

Kaneb Pipe Line Co.—246 miles, 8 and 10-in., under way, Wichita, Kans., to Fairmont, Neb. Ray L. Smith & Son, Inc.

• **Phillips Petroleum Co.**—54 miles, 6-in., planned, Goldsmith to Borger, Tex.

45 miles, 10-in., under way, Harrisonville, Mo. Mid States.

52 miles, 10-in., planned, Shell's Brookshire system to Sweeny, Tex.

Plantation Pipe Line Co.—82 miles, 14-in., under way, Charlotte to Greensboro, N. C. Anderson Bros.

• **Salt Lake Pipe Line Co.**—40 miles, 6-in., under way, Adams, Ore., to Pasco, Wash. Engineers, Ltd., P. L. Co.

Salt Lake Pipe Line Co.—140 miles, 8-in., under way, Pasco to Spokane, Wash. Lyles & Young Co. Completion date 10-1-53.

Standard Oil Co. (Ind.)—243 miles, 10-12 in., under way, Whiting, Ind. to River Rouge, Mich.

Calumet district, Indiana, Morrison Construction Co.

Lake County, Indiana boundary to Colon, Mich., Somerville Construction Co.

Colon to Romulus, Mich. R. B. Potashnick.

Romulus to River Rouge, Mich. R. L. Coolsaet Construction Co.

207 miles, 8-in., under way, Mandan, N. D. to Moorhead, Minn. Associated Pipe Line Contrs. 12-53

• **Sunray Oil Corp.**—440 miles, 10-in., proposed Duncan, Okla., to Mississippi River.

Sun Pipe Line Co.—50 miles, 8-in., under

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way, Toledo, Ohio to Inkster Junction west of Detroit. 10-53. R. L. Coolsaet Const. Co. and Poston Pipe Line Co.

• **Triangle Pipe Line Co.**—560 miles, proposed, Arkansas City, Ark., to Covington, Ky., and Nashville, Tenn.

• **United States Pipe Line Co.**—1,799 miles, 22-26-in., proposed, Beaumont, Tex., to Newark, N. J.

Beaumont, Tex., to Memphis, Tenn.
Memphis, Tenn., to Louisville, Ky.
Louisville, Ky., to Newark, N. J.
Laterals to Paducah and Lexington, Ky.

• **Williston Basin Pipe Line Co.**—244 miles, 8-in., proposed, Laurel-Billings, Mont., refineries to Glendive, Mont.

Wolverine Pipe Line System—200 miles, 14-in., Chicago-Toledo-Detroit. (Joint ownership of Shell, Texas and Cities Service.) Completion date 1-54.

East Chicago, Ind. to Kalamazoo River, Midwestern Constructors, Inc.

Marshall to Detroit, Mich. Anderson Brothers Corp.

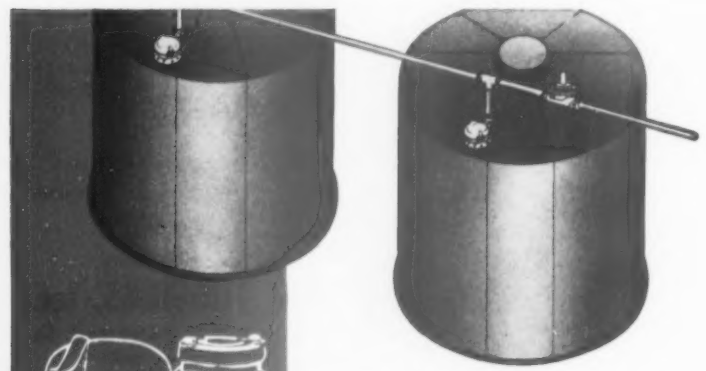
Yellowstone Pipe Line Co.—(Continental Oil Co., Interstate Oil Pipe Line Co., Union Oil Co., and H. Earl Clack interest) 540 miles, 10-in., planned, Billings, Mont., to Spokane, Wash.

Natural-Gas Pipe Lines

• **America-Louisiana Pipe Line Co.**—1,000 miles, 30-in., proposed, Lowry, La., to Detroit, Mich.

• **Arkansas-Missouri Power Co.** — 140 miles, 2 to 10-in., planned, St. Francis River, Clay County, Arkansas, to near Campbell, Mo.

• **Associated Natural Gas Co.**—88 miles, proposed, Missouri.



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Also used in the system is either the Enardo Series 800 or Series 1900 In-Line Vent Valve. The 1900 valve is diaphragm actuated eliminating pounding in the vapor line. Stack Valves may also be used. All these valves are corrosion resistant and have been found highly satisfactory especially in sour gas fields.

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"TAKING THE PULSE OF THE OIL INDUSTRY"

• **Atlantic Seaboard Corp.**—29 miles, 26-in., proposed, looping along Cobb-Rockville, Md., line.

• **Carolina Natural Gas Corp.**—185 miles, 2-12-in., proposed, lateral lines off Transcontinental in North and South Carolina.

• **Chattahoochee Natural Gas Co.**—70 miles, proposed, Floyd County, Georgia to Dalton, Ga.

• **Chicago District Pipe Line Co.**—31 miles, 24-30-in., proposed, East bank of Des Plaines River southwesterly to near Hodgkins, Ill., on through Cook County to Will County, Illinois.

• **Cities Service Gas Co.**—18 miles, 16-in., Lawrence and Newton counties, Missouri.

69 miles, 20-16-in., proposed, Cleveland, McClain, and Garvin counties, Oklahoma.

• **City of Fayette, Ala.**—20 miles, 5-in., proposed, Fayette, Ala., to Southern Natural's system in Tuscaloosa County, Ala.

• **Coast Counties Gas & Electric Co.**—40 miles, 3, 4, and 8-in., planned. Coast and Valley region, California.

• **Colorado Interstate Gas Co.**—365 miles, 22-in., proposed, Green River, Wyo., to Denver, Colo. 1954.

243 miles, 4 to 20-in., planned, Colorado, Oklahoma, Texas, and Kansas.

50 miles, 20-in., under way, Hugo to Eads, Colo. R. H. Fulton.

• **Cumberland and Allegheny Gas Co.**—31 miles, 12-in., proposed, Garrett County, Md., to Keyser, W. Va.

East Tennessee Natural Gas Co.—158 miles, 16-in., under way, Knoxville to Kingsport, Tenn. (58 miles of laterals.) 11-53.

• **El Paso Natural Gas Co.**—1,178 miles, proposed, Permian basin, New Mexico, Texas and Colorado.

El Paso Natural Gas Co.—771 miles, 30-in., under way, Plains, Tex. to Kingman, Ariz. 567 miles contracted by Oklahoma Pipe Line Constructors, R. H. Fulton and Co. and Western Pipe Line Contractors. 204 miles to be built by El Paso Natural construction organization.

• **Fort Worth Basin Gas Co.**—Planned, Novice, through Brown and Comanche counties, Texas.

• **Glacier Gas Co.**—285 miles, 20-in., proposed, Kalispell, Mont., to Spokane, Wash.

120 miles, 16-in., proposed, Spokane to Hanford, Wash.

91 miles, 8⅝-in., proposed, Spokane to Lewiston, Idaho.

130 miles, 12¾-in., proposed, Spokane to International boundary at Trail, British Columbia.

Gulf Interstate Gas Co.—860 miles, 30-in., under way. Acadia Parish, La., to Boyd County, Ky. H. C. Price and Houston Contracting. 11-54.

Under way, Rayne, La. to Kincade, Tenn. Houston Contr.

Under way, Gordonsburg, Tenn., to Catlettsburg, Ky. H. C. Price Co.

230 miles, gathering lines, contracted, Associated Pipe Line Contractors, Anderson Bros., Williams Bros.

329 miles, 12 to 24-in., proposed. Laterals off Acadia Parish, Louisiana, to Boyd County, Kentucky, line.

• **Home Gas Co.**—32 miles, 12-in., planned, Breesport to Union Center, N. Y.

17 miles, 12-in., proposed, loops from Hansock to Sanford, N. M.

Home Gas Co.—46 miles, 12-in., under way, Tioga and Broome counties, New York. H. L. Gentry Const.

22 miles, 12-16-in., under way, Binghampton, N. Y.

• **Interstate Power Co.**—26 miles, 8-in., proposed, from Nat. Gas P. L. Co. America line near Hooppole, Ill., to Clinton, Ia.

Iowa-Illinois Gas & Electric Co.—41 miles, 10-in., start last half '53, Washington County to Cedar Rrapids, Iowa.

• **Kansas-Nebraska Natural Gas Co.**—

41 miles, 10-12-in., proposed, Kansas and Nebraska.

Kansas-Nebraska Natural Gas Co., Inc.—54 miles, 4-6-in., under way, Neligh to Hartington, Neb. Brodie Constr. 9-53.

42 miles, 4-6-in., under way, Neligh to O'Neil, Neb. Brodie Const. 9-53.

61 miles, 3-2-in., under way, lateral lines from Broomfield through various towns to Wausa, Neb. Brodie Const. Co. 9-53.

41 miles, proposed, Albion, Arcadia, and Broken Bow, Neb.

• **Lone Star Gas Co.**—100 miles, proposed, storage fields to the Dallas-Fort Worth area.

35 miles, 12-in., proposed, southeastern Schleicher County.

36 miles, 12-in., planned, Stamford to Abilene, Tex.

Lone Star Gas Co.—44 miles, 12-in., under way, Red Springs, Woods County to Sulphur Springs area, Hopkins County, Texas.

• **Manufacturers Gas Light & Heat Co.**—40 miles, proposed, Allegheny, Washington, and Beaver counties, Pennsylvania.

213 miles, 3 to 26-in., proposed, various points on system in Pennsylvania, West Virginia, and Ohio.

72 miles, 16-20-in., proposed, Doddridge, Wetzel and Marshall counties, West Virginia.

• **Mississippi River Fuel Corp.**—109 miles, 10-18-in., planned, laterals in Woodlawn and Waskom gas fields, Texas.

Missouri Central Gas Co.—25 miles, 6-in., contracted, Moberly to Macon, Mo. L. R. Young Const. Co.

• **Missouri Public Service Co.**—136 miles, 8-10-in., proposed, New Franklin to Trenton, Mo.

24 miles, 10-in., Johnson County to Clinton, Mo.

• **Montana Power Co.**—52 miles, 16-in., planned, Canada - Montana border to Cut Bank, Mont.

• **Morganfield Natural Gas Co.**—31 miles, 4-6-in., planned, through Sturgis, Providence, Clay, Diamond, Wheatcroft, and Sullivan, Ky.

• **Natural Gas Producer Inc.**—100 miles, 12-in., planned, Yenter pool to Denver, Colo.

• **Nevada Natural Gas Pipe Line Co.**—114 miles, 12¾-in., proposed, Topock, Ariz., to Las Vegas, Nev.

• **New River Gas Co.**—50 miles, planned, Summers to Monroe counties, West Virginia, to Narrows and Dublin, W. Va.

• **New York State Electric and Gas Co.**—59 miles, 8-10-24-in., proposed, Oneonta and Norwich to DeRuyter, N. Y.

• **Northern Indiana Fuel & Light Co.**—33 miles, 8-in., proposed, Edgerton to Auburn, Ind.

• **Northern Natural Gas Co.**—458 miles, proposed, Kansas, Texas, Oklahoma, and Nebraska, Iowa and Minnesota to connect with Permian Basin System.

475 miles, proposed branch lines to Iowa, Nebraska, Minnesota and South Dakota.

Northern Natural Gas Co.—Section No. 1, 92 miles, 30-in., under way, Dumas via Sunray to main line north of Canadian River, Texas, and two loops near Beaver station, Oklahoma, R. H. Fulton & Co.

Northern Natural Gas Co.—Section 2, 70 miles, 30-in., contracted, loops near Mullinville, Bushton and Clifton stations, Kans., and Palmyra station, Neb. Lone Star Constructors.

Northern Natural Gas Co.—Section 3, 94 miles, 24-in., and 30-in., contracted loops near Paulina, Ogden, and Oakland stations, Iowa, G. G. Griffis Construction Co.

• **Northwest Natural Gas Co.**—750 miles, planned, Washington, Oregon, and Idaho.

24-in., Eastport, Idaho, to Monroe, Wash.

18-in., Monroe to International boundary near Lynden, Wash.

22-in., Monroe to near Seattle, Wash.

20-in., Seattle to Portland, Ore.

• **Ohio Fuel Gas Co.**—31 miles, 20-in., planned, Licking County to Richland County, Ohio.

22 miles, 16-in., planned, Dayton, Troy, Piqua, and Sidney, Ohio.

23 miles, 16-20-in., planned, Wellington to Elyria, Ohio; 16 miles, 20-in., planned, Benton Station to Crawford Station; 18 miles, 20-in., Crawford Station to near Columbus; 16 miles, 16-in., planned, Berlin to Sandusky, Ohio.

74 miles, 3 to 20-in., planned, Hocking, Knox, and Ashland counties, Ohio.

47 miles, 20-in., planned, Benton Township, Hocking County, to Columbus, Ohio.

61 miles, planned, northern and southwestern Ohio.

33 miles, 20-in., proposed, Jefferson to Seneca, Ohio.

69 miles, 20-24-in., proposed, lines to tiein Gulf Interstate line along various points in Lawrence, Jackson, Vinton, Hocking and Fairfield counties, Ohio.

• **Pacific Gas & Electric Co.**—50 miles, 12-16-20-in., planned, Fresno to Merced, Calif.

(Section 2) 20-in., Holm to Topock-Milpitas line.

(Section 3) 12-in., parallel existing Madera-Livingston line, planned. Napa Wye to Shellville; Cotati to Santa Rosa, Calif.

170 miles, 34-in., proposed, main-line loops along Topock, Ariz., to Milpitas, Calif.

Pacific Gas & Electric Co.—86 miles, 34-in., under way, parallel sections along Topock-Milpitas line. Engineers Pipe Line, Ltd. Summer 1953.

• **Pacific Northwest Pipeline Corp.**—1,466 miles, proposed, Ignacio, Colo., to Bellingham, Wash.

380 miles, proposed, laterals and spurs off main line to Pocatello, Idaho, to Yakima, Wash.

Permian Basin Pipeline Co.—280 miles, 16-24-26-30-in., under way, West Texas and New Mexico. R. H. Fulton & Co.

Public Service Co. of Colorado—34 miles, under way, Douglas Creek and other gas fields to Grand Junction, Colo., area. Foutz & Buraum Const. Co. 9-1-53.

• **Rockland Light & Power Co.**—22 miles, 8-in., proposed, Orangetown to Tompkins Cove, N. Y.

• **Shenandoah Gas Co.**—39 miles, 3-4-8-in., proposed, Middleton, Va., to Martinsburg, W. Va.

Signal Oil and Gas Co.—170 miles, 3½-34 in., under way, Tioga-Beaver Lodge gathering system. Completion date 9-53.

• **South Carolina Gas & Electric Co.**—160 miles, 16-12-10-in., proposed, Aiken, S. C., to cities of Columbia, Summerville, and Charleston, S. C. Williams Bros. Completion date 12-31.

• **South Georgia Natural Gas Co.**—339 miles, 2-12-in., planned, Phoenix, Alta., to Tallahassee, Fla. (a) 12-in., Phoenix, Ala., to Albany, Ga., (b) 10-in., Albany, Ga., to Moultrie, Ga., (c) 8-in., Moultrie, Ga., to Tallahassee.

• **Southern California Gas Co., and Southern Counties Gas Co.**—73 miles, 30-in., planned, loops on main line from Blythe to Los Angeles.

Southern Natural Gas Co.—1,235 miles, 24 to 4½-in., under way, Louisiana, Mississippi, Alabama, and Georgia, and South Carolina. Houston Contracting, Latex and H. C. Price. Fall 1953.

Under way, Mississippi, Alabama, and Georgia.

Bass Junction, Ga., to South of Wrens, Ga., Houston Contr. 9-53.

• **Southwest Gas Corp., Ltd.**—26 miles, proposed, from P.G.&E. line to Victorville, Calif.

• **Tennessee Gas Transmission Co.**—574 miles, 30-in., proposed, Kinder, La., northeast through Louisiana, Mississippi, to Portland, Tenn.

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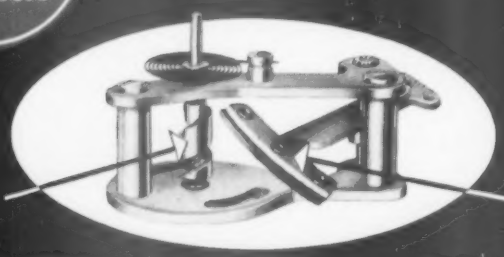

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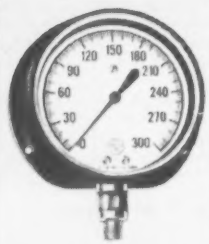
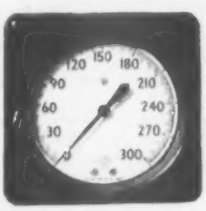
HELICOID Gages are made for vacuum, pressure, or compound service—in all pressure ranges. White, black, or radiant faces. Wall, stem, flush, and panel mountings, or flangeless cases.





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130 miles, proposed, looping in Texas and Louisiana. Including 67 miles of 30-in. line.

63 miles, 26-in., proposed, loop near Greenup, Ky., and Mercer, Pa.

45 miles, 20-in., proposed, Buffalo, N. Y., to the U. S.-Canadian border Hamburg station near St. Catherines.

Tennessee Gas Transmission Co.—20 miles, 30-in., under way, Nachitoches, La., to Goldonna, La. Oklahoma Contracting Co.

18 miles, 30-in., under way, Middletown to Selmer, Tenn. Oklahoma Contracting Co.

35 miles, contracted, Campbellsville, Ky., to Danville, Ky. Western Pipe Line Constructors.

21 miles, 26-in., under way, Carter, Ky., to Ohio River. Western Pipe Line Constructors.

60 miles, 24-in., under way, Pigeon, Pa., to Hebron field, Porter County, Pennsylvania. Bechtel Corp.

• **Texas-Ohio Gas Co.**—1,435 miles, 30-in., proposed, Hidalgo County, Texas, through Arkansas, Mississippi, Tennessee, and Kentucky on to Spencer, W. Va.

• **Trans-Northwest Gas, Inc.**—246 miles, proposed, International Boundary near Osoyoos, B. C., to Washington and Idaho.

275 miles, branch lines.

• **United Gas Fuel Co., and Central Kentucky Natural Gas Co.**—92 miles proposed, Gulf Interstate system, Boyd County, Ky., to Putnam County, West Virginia.

• **United Fuel Gas Co.**—50 miles, 20-24-in., proposed, Wood County to Lanham, W. Va. Spring 1954.

32 miles, 24-in., proposed, near Ripley, W. Va., to Lanham station, Putnam County, W. Va.

60 miles, 30-in., proposed, Lanham in Kanawha County, West Virginia, to Gulf Interstate line in Boyd County, Ky.

• **United Gas Pipe Line Co.**—44 miles, 20-in., planned, Lirette field to Harvey, La.

• **United Natural Gas Co.**—50 miles, 12-in., planned, Elk County to Jefferson County, Pennsylvania.

• **Utah Natural Gas Co.**—103 miles, 16-18-in., proposed, Clear Creek field near Price to Salt Lake City, Utah.

18-in., Clear Creek to Provo, Utah.

16-in., Provo to Salt Lake City, Utah.

Virginia Natural Gas Co.—153 miles, Buckingham to Richmond and Portsmouth, Va.

Warren Petroleum Corp.—78 miles, 2-24-in., proposed, Lovington, N. M. Completion date 9-53.

Westcoast Transmission Co., Ltd. — (See foreign natural gas pipe lines).

Foreign Crude-Oil Pipe Lines

Basrah Petroleum Co. — 65 miles, 24-in., under way, Zubair to Fao, Iraq. Completion date 10-53.

Bombay Port Trust.—50 miles, 8 to 24-in., contracted, Bombay, India, to serve Standard Vacuum Oil Co., and Burmah Shell refineries. Merritt, Chapman & Scott Corp., contractors. (Crude and Products.)

• **Creole Petroleum Corp.**—25 miles, 34-in., planned, Lagunillas to La Salina (State of Zulia, Venezuela.)

Direccion General de Yacimientos Petroliferos Fiscales—409 miles, under way, Plaza Huincul to Bahia Blanca, Argentina.

• **Gaz de France**—200 miles, 12-in. Ruhr to Paris, France.

• **Petroleos Mexicanos.**—145 miles, 12-in., considered, 18 de Marzo field via Reynosa to Monterrey, Mexico.

100 miles, planned, Isthmus of Tehuantepec, Jose Colomo to El Plan field, Minatitlan.

72 miles, 12-in., proposed, Poza Rica to Atzacapotzalco, Mexico.

Petroleos Mexicanos.—125 miles, 10-in., under way, Jose Colomo to El Plan, Mexico.

• **Saskatoon Pipe Line, Ltd.**—56 miles, 6-in., planned, Milden to Saskatoon, Sask.

Texas Petroleum Co. — 60 miles, 4-6-in., under way, Pta. Nino to La Dorada.

• **Trans Mountain Oil Pipe Line Co.**— 30 miles, planned, Vancouver, B. C., terminal to Ferndale, Wash.

Trans Mountain Oil Pipeline Co.—711 miles, 24-in., under way, Edmonton, Alta., to Vancouver, B. C. Canadian Bechtel, Ltd., engineers. Completion date 9-53.

Sumas to Vancouver, B. C., Comstock Midwestern. 9-53.

• **Yacimientos Petroliferos Fiscales Bolivianos.**—170 miles, 4-in., planned, Bermejo to Tupiza, Bolivia.

Foreign Products Pipe Lines

Columbian Ministry of Petroleum—115 miles, 4-in., begin 1953, La Dorado to Cartago, Colombia, Williams Bros. Engineers.

93 miles, 8-in., begin 1953, Cantimplora to Dorado, Colombia, William Bros. Constructors.

• **Empresa Nacional del Petroleo** — 80 miles, 6⅝-in., planned, Concon to Santiago, Chile.

Empresa de Ferrocarriles Ecuatorianos.—50 miles, 6-in., contracted, Guayaquil to Palmira, Ecuador. J. A. Jones, contractor; C.R.C. Engineering Co., engineers.

• **Governments of Southern Rhodesia and Portuguese East Africa.**—200 miles, considered, Beria, Portuguese Mozambique to Umtalia, Southern Rhodesia.

North Atlantic Treaty Organization (NATO)—1,920 miles, 4-10-in., to serve military bases in Western Europe (to connect with U. S. Government's St. Nazaire-Paris-Metz line.) Contracted by Soc. Foster Wheeler Francaise.

• **Petroleos Mexicanos.**—124 miles, 6-in., planned, Lagos to Guadalajara, Mexico.

54 miles, 6-in., planned, Lagos to Aguascalientes, Mexico.

82 miles, 8-in., planned, Salamanca to Lagos, Mexico.

Shell Co. of Australia.—34 miles, 8-in., under way, Geelong, Melbourne Ref. to connect with installations at Newport, Australia, Taylor Woodrow. 11-53.

Sun-Canadian Pipe Line Co., Ltd.—200 miles, 8-in., under way, Sarnia, Hamilton, Toronto, Ont. Williams Bros. 10-53.

• **United States Government.**—375 miles, 12-in., planned, St. Nazaire to Melun and Metz, France.

• **United States and Canadian Governments**—600 miles, 8-in., planned, Haines to Fairbanks, Alaska.

Foreign Natural-Gas Pipe Lines

Azienda Generale Italiana Petroli.—110 miles, 12-14-16-in., under way, Cortemaggiore to Genoa. Completion date 11-53.

"All he'll say is, 'It's Saturday, ain't it?'"

Azienda Generale Italiana Petroli — 90 miles, 12-in., under way, Cortemaggiore to Bologna, Italy, SNAM crews.

120 miles, 16-in., under way, Cremona Porto Mar to Ghera, Italy, Montubi, contractor.

40 miles, 12-in., under way, Ripalta-Bergamo, Italy.

Direcion General del Gas del Estado— 310 miles, 8-in., under way, Plaza Huincul to Neuquen, Argentina, to the vicinity of General Conesa, Argentina.

• **Empresa Nacional del Petroleo** — 80 miles, 10-in., planned, Concon to Santiago, Chile.

• **Mid-Continent Pipelines, Ltd.** — 1,860 miles, 30-in., proposed, Alberta to Montreal, Canada. Fish Engineering Co.

• **Northwest Natural Gas Co.**—950 miles, 24-in., planned, Alberta fields to Vancouver, B. C., Seattle, Wash., and Portland, Ore.

Petroleos Mexicanos. — 205 miles, 16-in., under way, Monterrey to Torreon, Mexico.

• **Petroleos Mexicanos.**—440 miles, 20-in., planned, Brazil to Tampico to Poza Rica, Mexico.

• **Trans-Canada Pipe Lines, Ltd. (Canadian Delhi Oil Co.)**—2,247 miles, 14 to 30-in., proposed, Alberta to Toronto to Montreal.

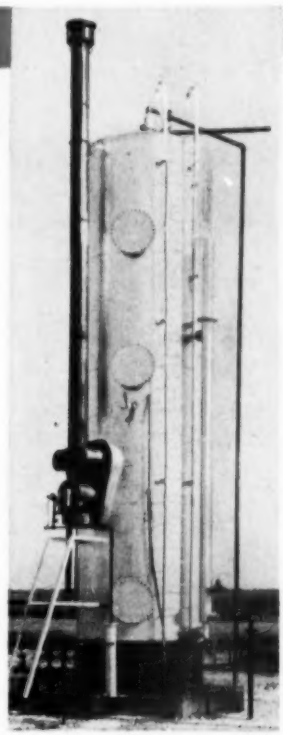
747 miles, 8 to 24-in., gathering system in Alberta.

• **Westcoast Transmission Co., Ltd.**—1,110 miles, 24-in., planned, Dawson Creek, B. C., through Pine Pass and Fraser River Valley to Kamloops, Princeton, and Vancouver to Portland. Ford, Bacon & Davis, engineers.

280 miles, 20-in., planned, Pincher Creek to Montana on to Spokane, Wash. Ford, Bacon & Davis, engineers.

138 miles, 20-in., planned, Sumas to Tacoma, Wash.

LOWER operating and maintenance costs . . .



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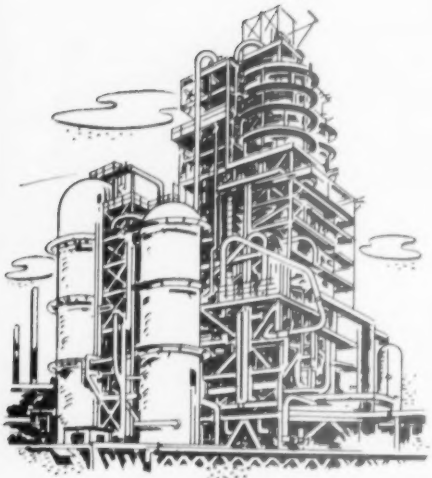

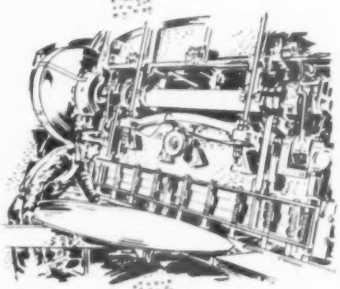

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If you buy under the code of implicit faith in the manufacturer, you will find WYATT METAL & BOILER WORKS fully capable of shouldering all responsibilities for finished work.

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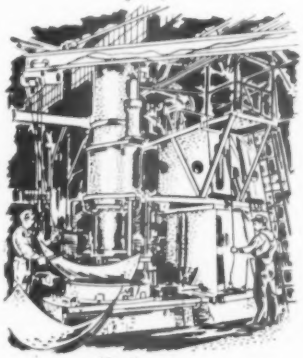

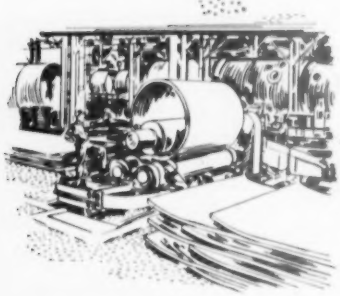

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IT'S NEW — CHECK IT

TRADE LITERATURE

1 THE CARE AND USE OF OIL-GAGING TAPES, a heavy index pocket-size folder, tells how to get the most accurate readings and longest service from a gaging tape. The gaging diagram for conventional tanks is illustrated, along with innage and outage bobs, and Atlas gaging tapes. *The Lufkin Rule Co.*

2 A BETTER BOND FOR ORGANIC FINISHES describes complete line of Turcoating materials. Designed to fill every phosphating requirement and to meet every applicable Government specification, the Turcoat line is comprised of six materials, one of which will provide correct coating for any type of organic finishing. Bulletin includes phosphating reference chart, which outlines purpose of phosphate coatings, recommended uses, methods of application, and equipment required. *Turco Products, Inc.*

3 UTILITY HEATERS, a handy, four-page, two-color catalog, describes and illustrates utility heaters designed for mobile units and small space heating, precision-built for use with 35-psi. hot water, or 5-psi. steam systems. Mobile-unit models are available with or without defroster equipment, furnished with mounting brackets, and may be free-standing, wall-hung, or flush-mounted. *Young Radiator Co.*

4 PACKAGED ADJUSTABLE-VOLTAGE DRIVES for variable-speed applications are covered in a 16-page booklet, which gives complete data on construction and operation, typical applications, and economics of operation. Operational characteristics such as inching, reversing, dynamic braking, and multimotor control are described. *Westinghouse Electric Corp.*

5 BULLETIN —943 graphically presents essential features and applications of 10 basic types of industrial filtration equipment, including disk cartridge, and pressure-type filters; flotation units; vacuum stills; magnetic separators; and oil conditioners. *U. S. Hoffman Machinery Corp.*

6 BOLINDERS 4-CYCLE STATIONARY OIL ENGINES TYPE 1053 K is a colorful brochure which describes each engine working part in detail, including rated output, sizes and particulars. Power speed table, dimensions, and chart on approximate shipping specifications are shown. *Ak. Bolinder-Munktell.*

7 TEMPERATURE CONTROL. Bulletin 101 covers Models H-1S and V-1S which are primarily used for high-temperature safety alarms and cutouts up to 1,800° F. Included are complete descriptions of operation, dimensions, methods of mounting, and operating specifications. *The Burling Instrument Co.*

8 DIAMOND-CORE AND DRILL-BIT SELECTOR, a 15-page multicolored brochure, describes and pictures solid crown bits; insert-type, Dia-Pak impregnated bits; ripper step, noncoring, oil-field bits; and casing bits and casing show bits, reaming shells, and diamond-set inserts for field fabrication. A chart is included on standard inserts. *Koebel Diamond Tool Co.*

9 LOCO MULTITUBULAR BOILERS, a 12-page catalog, illustrates and describes high-pressure boilers for working pressures up to 350 psi., including all-welded oil drilling boiler, and Thermax boiler with evaporation capacities from 1,000 to 14,000 lb. per hour. Bulletin also contains typical ap-

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Corresponding to new equipment items or trade literature abstracts in the Oil and Gas Equipment Digest of The Oil and Gas Journal, Sept. 7, 1953

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COMPANY NAME .....
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OIL AND GAS EQUIPMENT Digest — CHECK IT

plication photographs in various industries. *Ruston & Hornsby, Ltd.*

10 PENMETAL EXPANDED METAL GRATINGS, a four-page folder, illustrates and describes Treadway, Hiwalk and 3, 4, and 6.25-lb. grating. Deflection tables for each of five types, as well as approximate weights and dimensions are included. *Penn Metal Co.*

11 SPOTLIGHTING THE NEW YARD-STOR SHELTER. This brochure describes metal storage building for storage of heavy machinery and equipment. It is sectional and mounts on a track. Sections tilt from either side for easy access, or may be slid apart to provide unlimited head room for handling. Sections may also be telescoped, and all sections may be nested at the ends to expose entire contents of shelter. *The Joe Martin Co., Inc.*

12 OIL BURNERS, a condensed 16-page catalog, lists commercial and industrial oil and combination gas-oil burners, including fully automatic, semiautomatic and manually controlled horizontal rotary and steam turbine drive burners; commercial and domestic pressure atomizing types for oil, gas or combination gas-oil. Specifications and capacities are given. *Ray Oil Burner Co.*

13 CLAD STEEL DATA CARD. Conversion tables and theoretical weights for clad steel plates are conveniently assembled on a new information card, which also includes an inch-equivalent-for-sheet-thickness table for A.I.S.I. manufacturers' standard gage steel sheet, and U. S. standard gage stainless, nickel, Inconel, and Monel sheet. *Lukens Steel Co.*

14 MODEL 25 FORCE-FEED LUBRICATORS. This catalog discusses new high-pressure force-feed lubricators designed for service up to 30,000 lb. Model HP20 has pump assembly with 5/16-in.-diameter plunger and will pump 6½ drops of S.A.E. 40 oil per stroke against 20,000 psig. Model HP30 with ¼-in.-diameter plunger pumps four drops of S.A.E. 40 oil per stroke against 30,000 psig. Both units are directly connected to gear motor and attached to rigid base. *Baldwin, Bowers & Strachan, Inc.*

15 COUNTERPOISE PIPE HANGER for high-temperature piping systems in steam-gathering stations, refineries, and chemical plants are described in Bulletin 153. Graphs for aid in selecting proper hangers, tables of dimensions, plus erection and field adjustment instructions are given along with illustrations of typical installations. *National Valve & Manufacturing Co.*

16 PETRO-CHEM BULLETIN 53-1 describes Isoflow radiant convection furnaces. Isoflow design consists of upright cylindrical steel structure with integral self-supporting stack. Uniform heat-transfer rates are obtained by subjecting heating surface nearest flame burst to controlled amount of radiant heat while upper sections of heating surface are subjected to varying proportions of direct radiant, secondary radiant, and convection heat. *Petro-Chem Development Co.*

17 DEEP WATERS is a new bi-monthly company magazine being published by Layne & Bowler, Inc., and Layne Associate companies. Printed in color and liberally illustrated, it carries unusual stories about water, articles on water development, and features with a water angle. *Layne & Bowler, Inc.*

18 BULLETIN L-7696, a six-page, two-color bulletin, to fit standard three-ring binders, describes horizontal and vertical models of 404, 451, and 477-cu. in. Fageol gasoline engines for stationary and automotive applications. It is profusely illustrated with photographs, cutaway and section views, horsepower and torque curves, dimensional drawings, and condensed specifications. *Fageol Products Div., Twin Coach Co.*

19 BULLETIN C-100 describes and illustrates Schield Bantam's recently introduced C-35 crawler crane excavator. Bulletin gives complete specifications and engineering data descriptive of the new machine. *Schield Bantam Co.*

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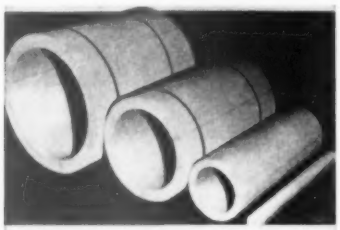
DIGEST OF NEW EQUIPMENT

IT'S NEW CHECK IT

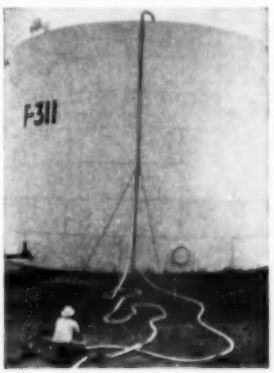
by Dan B. Miller

20 KAYLO HEAT INSULATIONS. Hydrous calcium silicate pipe and block insulations for high-temperature ranges are effective to temperatures of 1,200° F. The pipe and block are used as industrial insulation for such equipment as: autoclaves, boilers, breechings, condensers, dryers, evaporators, furnaces, heat exchangers, hot air ducts, annealing furnaces, precipitators, process systems, steam lines, tanks, towers, turbines, and vessels. Kaylo heat insulation is made of a chemical compound of lime and silica, and combines the most desirable characteristics of heat-insulation materials in the high-temperature ranges. Kaylo heat insulation remains strong (compressive strength, 150 psi.) and efficient for many years and shows little shrinkage after exposure to temperatures to 1,200° F. Kaylo is light in weight (11 lb. per cubic foot) thus simplifying handling, shipping, and application. Because of its wide effective range and its simplified dimensional standards which allow nesting, use of Kaylo pipe insulation reduces inventory requirements. It is produced in thicknesses and diameters for pipe sizes from ½ to 23 in. Outside diameters of the insulation correspond to those of standard pipes assuring proper fit for each pipe size and for nesting, when necessary. The Kaylo block is made in standard widths to 18 in. and in thicknesses to 3 in. Block is used as single-layer insulation for flat surfaces to 700° F., and in double layers from 700° to 1,200° F. Length is 36 in. *Owens-Corning Fiberglass Corp.*



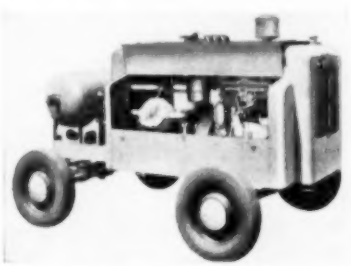
IT'S NEW CHECK IT

21 HYDRAULIC FOAM TOWER. A completely new portable foam tower, raised and lowered by hydraulic action, is used in the fighting of flammable liquid tank fires. The tower can be set up in a fraction of the time formerly needed, and with one-third the manpower. The same tower may be used for tanks of varying height, and a simple conversion operation, easily accomplished in the field, adapts the tower for chemical foam use. Quick, dependable hydraulic action, which can be applied at a safe distance from the fire, raises the tower to full height in a matter of seconds. When it is elevated to a point above the upper edge of the tank wall, pressure is released and the tower gradually descends until the gooseneck is hooked over the edge of the wall. Foam is then discharged against the inside of the tank wall, and flows down across the burning surface. Lowering of the tower is as easy and as fast as elevating it. Hydraulic pressure is again applied to raise the unit. It is then pulled away from the tank and the tower gradually descends as the pressure is released. There is no danger of inadequate water pressure to raise the tower, since less is needed for that purpose than to operate the foam system itself. *National Foam System, Inc.*



IT'S NEW CHECK IT

22 SUPER CHIEF 160, a new 160-cu.-ft. per minute portable compressor, is available in two-wheel and four-wheel trailer and in skid mountings the new unit is from 200 to 1,000 lb. lighter than other compressors of the same capacity. The unit has two low-pressure cylinders with 6-in. bore and 3¾-in. stroke; and one high-pressure cylinder with 5¼-in. bore and 3¾-in. stroke. It is offered in both gasoline and diesel-powered models. Standard features include automatic compressor-engine controls; individually finned cylinders, separately replaceable; full force-feed lubrication; cast-aluminum crankcase; multiport valves; electric start-



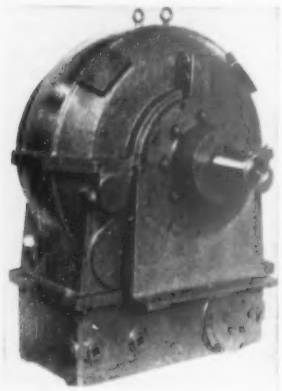
KEEP INFORMED ✓SAVE TIME ✓TEAR OUT CARD ✓CHECK IT ✓MAIL IT

This Digest of New Equipment offers you a quick resume of important features of new or improved products and trade literature and the opportunity to obtain complete information on each subject by use of the convenient "CHECK IT - MAIL IT" service card.

ing; automotive-type steering; full spring suspension; and double, built-in, full-length tool boxes. The four-wheel trailer is 115 in. long, 75 in. wide, and 70 in. high. Net weight is 4,300 lb. *Davey Compressor Co.*

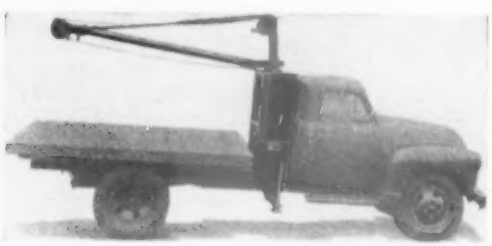
IT'S NEW CHECK IT

23 TWO HYDRAULIC TORQUE CONVERTERS, newly designed for use with high-torque, medium-speed oil-field drilling engines cover a power range of from 325 to more than 1,000 hp. Engines can operate at peak performance with no lugging, since the converter automatically varies the output shaft speed and torque multiplication instantly to suit changing power requirements. Drill-pipe loads are started up with high torque at low speeds and accelerated under full power. Pump speed adjusts automatically as drilling progresses. The torque converter lengthens the life of both engine and driven equipment because it acts as a cushion, smoothing the flow of power and preventing transmission of shock and vibration in either direction. Both converters, the 29½-in. Type A-295-F and the 34¼-in. Type A-342-F, are mounted on a standard No. 00 flywheel housing and add only 36½ in. to the overall length of the engine. *The National Supply Co.*



IT'S NEW CHECK IT

24 SELF-LOADING TRUCK CRANE. Available in a wide range of capacities, from ½ to 2-ton lifts, the unit converts a truck into a self-loading truck-crane that speeds materials handling jobs. Loaders are particularly adaptable for use in oil, construction, and utility operations. The crane unit mounts directly behind the cab and occupies only from 16 to 18 in. of space. There is no reduction in truck body or platform capacity and the entire load-carrying capacity of the bed is retained. The loader is made in two models; one with an elevating mast, and one with a "fold-over" superstructure. In the latter model, the top portion of the structure can be folded down for traveling, and for bridge and door clearance. Standard loaders will pick up loads from any radius up to 16 ft. On the fold-over models, the boom swings 170°. On the elevating-mast models the swing is a full 360°. Power for hoisting is supplied by the truck engine through a power takeoff. *Ray-Lind Manufacturing Co.*

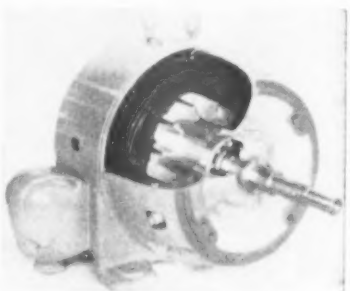


IT'S NEW CHECK IT

25 BULLARD-BURNHAM SAFETY HOOK locks automatically and will not open unless the pin is manually depressed. The new design uses the hook shank as its operating base yet does not obstruct the throat of the hook. The rustproof gate, which can be adapted to fit all makes and sizes of standard hooks, opens and closes with ease in all weather. It swings open horizontally on the shank axle so that even a full hook load will not snag in loading or unloading operations. Hooks are drop-forged steel as supplied by established hook manufacturers. Component parts are cadmium plated. Noncorrosive safety gates are of brass and are available with or without return spring for automatic closing. Rustproof lock pins are of Duronze. The safety hooks are now available in sizes 2 to 16A. Hooks with greater weight capacities available on special order. *E. D. Bullard Co.*

IT'S NEW CHECK IT

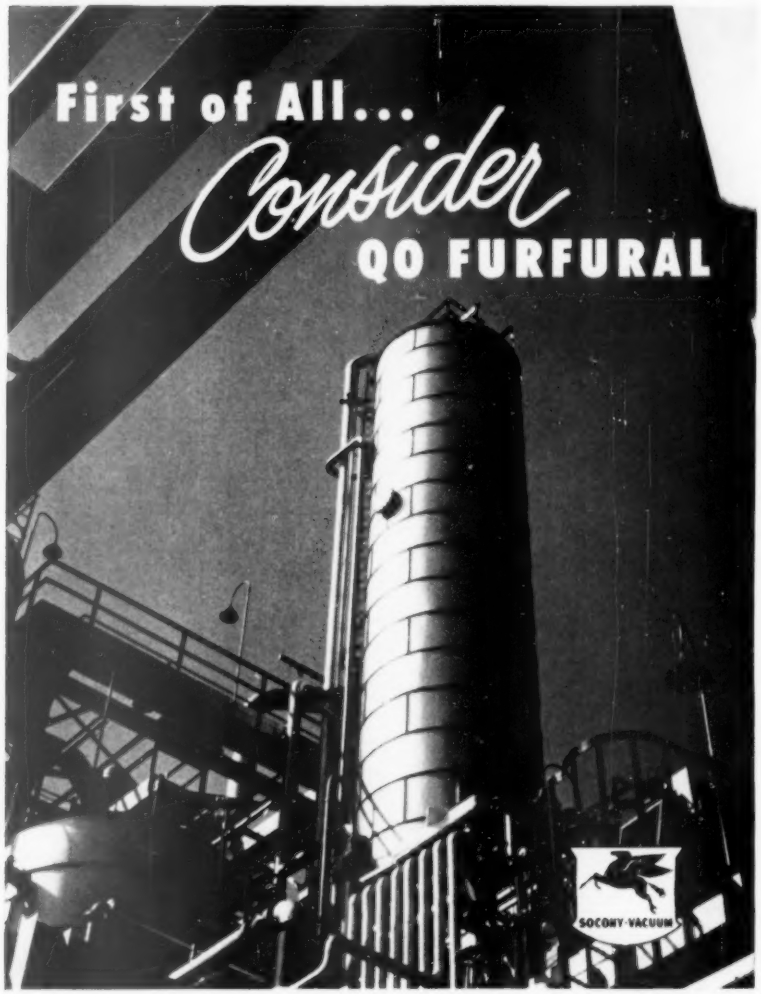
26 NEW 60 HP. CLOSE-COUPLED PUMP MOTOR designed specifically for use with centrifugal pumps. This motor, Type SCB, eliminates shaft-alignment or pump-mounting problems by supporting the pump on its N.E.-M.A. style "C" registered mounting bracket. A step shaft, with special diameter, shoulder and tapped hole for mounting the impeller, has all ground diameters for precision assembly and sealing against leakage. Grease-lubricated ball bearings permit vertical, horizontal, or any intermediate angle installation. Bearings are ample to carry the thrust of centrifugal pumps. A solid, closed flange on the style "C" adapter bracket prevents entrance of the pumped liquid into the motor. To further effect this protection, a corrosive-resistant, bronze slinger is mounted on the takeoff shaft for deflection of any packing leakage. *U. S. Electrical Motors, Inc.*



IT'S NEW CHECK IT

27 COMPACT VERTICAL SCALE INDICATOR has been designed for applications where panel space is limited. Only 6½ in. wide, the instrument saves 60 per cent of the space formerly required by a conventional

for high yields of high quality oil at low cost



Furfural lubricating oil treating tower in the refinery of the Socony-Vacuum Oil Co., Inc., one of the large users of the Furfural Process.

QO FURAN CHEMICALS ®

Furfural
Furfuryl Alcohol
Tetrahydrofurfuryl Alcohol
Furoic Acid
Fur-Ag® Conditioner
Furafil® Ligno-cellulose

If you would like to know more about furfural and its uses in the petroleum industry, a request on your letterhead will bring prompt information.

Find Out Why Leading Refiners Choose FURFURAL as a Selective Solvent

SEPARATION

Furfural is a polar molecule and gives sharp separation between the mixtures of products present in lube stocks. Its high specific gravity permits rapid phase separation.

RECOVERY

Furfural is a stable compound and may be recovered almost quantitively for reuse.

SAFETY

Furfural is easy to handle and has a safety record extending over 30 years of industrial use.

STORAGE

Furfural is shipped in tank cars and stored in steel tanks. Its low freezing point makes it easy to handle in cold weather.

AVAILABILITY

Furfural is produced the year around in large quantities at three plants from replaceable raw materials. It is low in price.

Furfural is being used in more than 38 petroleum processing plants throughout the world. Most of these are designed for refining lubricating oil, but other petroleum fractions are being successfully treated with furfural.

QO FURAN CHEMICALS

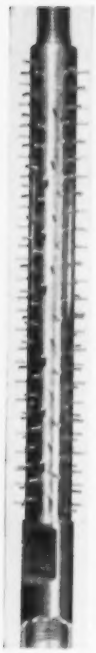
The Quaker Oats Company CHEMICALS DEPT.

339J The Merchandise Mart, Chicago 54, Illinois
Room 539J, 120 Wall St., New York 5, N. Y.
Room 439J, P. O. Box 4376, Portland 8, Oregon

In the United Kingdom: Imperial Chemical Industries Ltd., Billingham, England
In Europe: Quaker Oats-Graanproducten N. V., Rotterdam, The Netherlands; Quaker Oats (France) S. A., 3, Rue Pillet-Will, Paris IX, France
In Australia: Swift & Company, Pty., Ltd., Sydney • **In Japan:** F. Kanematsu & Company Ltd., Tokyo

model indicator. The principal feature of the new instrument, called the ElectroniK Vertical Scale Precision Indicator, is the rotating scale with fixed index. The scales are illuminated with black numbers and division lines on a white drum. Twin hairlines, used for close observance, prevent parallax errors. The vertical scale indicator incorporates the null-balance method of measurement. Heart of the indicator is the continuous balance unit, which amplifies millivolts up to the necessary power needed to operate the balancing motor. The electronic circuit is rugged, vibrationproof and not affected by stray currents or line-voltage variations. *Minneapolis-Honeywell Regulator Co.*

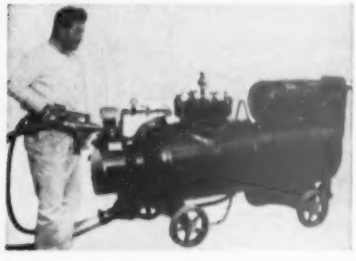
IT'S NEW CHECK IT



28 PARAFFIN SCRATCHER. This durable unit may be used as a service tool placed above a collapsible scraper. It will break up the paraffin which collects in the hole. The paraffin scratcher can also be built into the rod string below the paraffin zone and above the pump. It is built in any rod or tubing size. *Baird Manufacturing Co.*

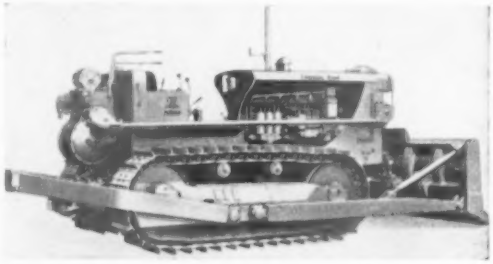
IT'S NEW CHECK IT

29 NEW WET-MIX UNIT FOR PNEUMATIC GUN EMPLACEMENT OF REFRACTORY AND STRUCTURAL CEMENTS incorporates premixing of material with the required metered volume of water, permitting exact duplication of consecutive charges and eliminating the possibility of inclusion of dry pockets within the applied layer. The premixed materials are pressured through hose to the gun, where a separate air supply breaks it and conveys it to the target. Rebound loss is limited to normally 1 to 5 per cent. Dusting and haze are eliminated, reducing operating-area hazards. Homogeneity and compactness of applied material give increased strength. Materials ranging from 10-lb. per cubic foot rock-wool cement, through asphalt-cork emulsions and structural concretes, to 200-lb. per cubic-foot refractories can be handled. Heavy-duty construction and convenient dimensions (10-cu. ft. unit pictured is 7 ft. long) are featured. Mixer driver may be gasoline engine or electric motor. A 105-cu.-ft. per minute, 100-psi. air compressor will supply adequate air. Some uses are the lining of catalytic cracker regenerators, heaters, and boilers; outside insulation of hot tanks and towers; fireproofing of structural steel; lining concrete pits and ponds; construction, repair and insulation of buildings; coating of pipe lines; and lining of tanks for corrosion protection. *R. F. Buck Co.*



IT'S NEW CHECK IT

30 A D8 PUSHER TRACTOR, adapted and equipped specifically for pusher loading work, is a modified version of the D8 tractor. The complete pusher package, 150-hp. drawbar tractor, No. 8S bulldozer, and No. 25 cable control, has been developed to meet a demand for a tractor capable of heap loading large scrapers. The D8 Pusher Tractor has four special features: (1) More powerful engine. Caterpillar's D13000 engine has been modified to produce 150 hp. drawbar at 1,200 r.p.m.; (2) weight increased to 50,025 lb. for better pusher balance and increased traction; (3) bulldozer and cable controls for in-line pushing action and cleanup of cut; (4) new transmission for the most suitable pushing speed and oil-type clutches for longer life. One of the outstanding features is the tandem pusher frame attachment. By permitting the transfer of power from one tractor to another through the track roller frame, the highly destructive stresses imposed on the lead tractor's final drive is avoided. *Caterpillar Tractor Co.*



IT'S NEW CHECK IT

31 CLEAR SPAN BRIDGE. Principal features of the bridge are its box girders, its lack of heavy steel structures over or under the bridge span, and its use of less steel, less time, and less labor than a convential bridge. Other points of interest are: the box girder beams actually float in 2 ft. of water (several of them tied together can make a barge or a floating dock), the bridge can be built in almost inaccessible locations, and it has tremendous load-bearing qualities. The bridge can be built from 30 ft. to any span desired. The box-girder design with its interior bracing is the secret to the bridge. It comes in various lengths, and can be fabricated on an assembly-line basis using an alphabet code as a means of getting greater speed and economy. A Clear Span bridge can be designed, fabricated, and completed for traffic in from 1 to 3 months. *Clear-Span Engineering Co.*

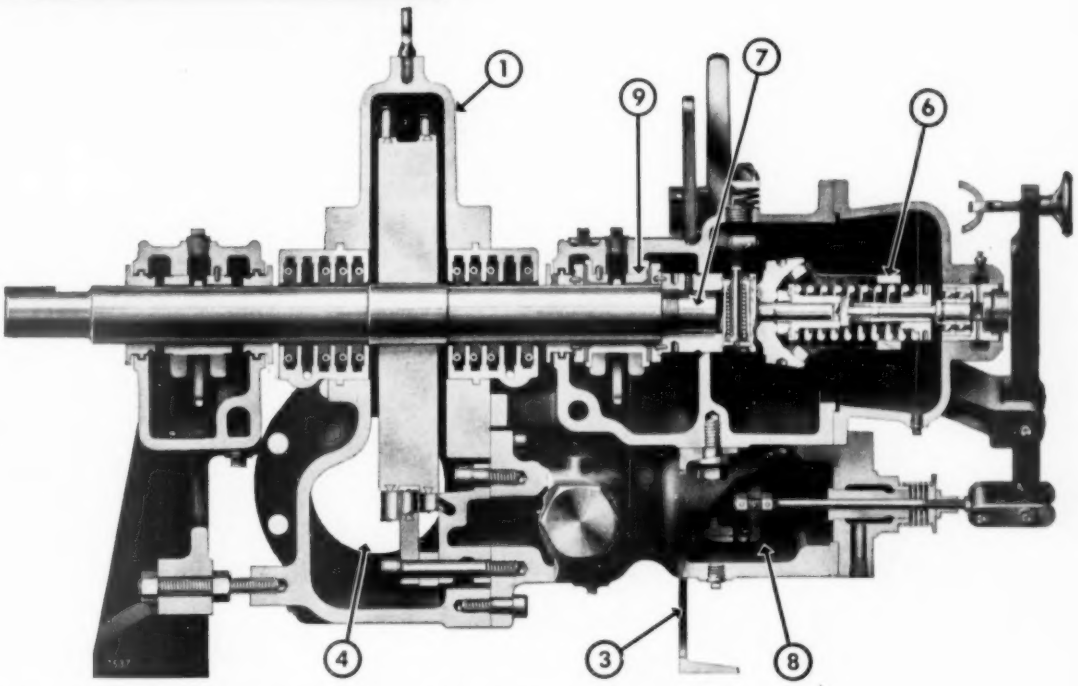
IT'S NEW CHECK IT

NEW **DE LAVAL**

HCB

SINGLE STAGE TURBINE

can be ordered from stock



1 Case and Cover Split Horizontally on centerline for ease of maintenance.

2 True Centerline Casing Support assures distortion-free radial expansion. *Not shown.*

3 Flexible Support at governor end provides for axial expansion.

4 Exhaust Opening either right or left side for installation flexibility.

5 Steam Strainer, protecting trip and governor valves, is *removable* for cleaning without breaking steam connections. *Not shown.*

6 Constant Speed Governor features governor weights pivoted around frictionless surfaces.

7 Complete Governor Assembly is now *replaceable as a unit.*

8 Balanced Single Seated Main Governor Valve has proportional flow characteristics for sensitive, positive control.

9 Shaft Locating Bearing of adjustable double collar type.

Horsepower: 100 MAX
Steam Pressure: 300 PSIG MAX
Steam Temperature: 550F MAX
Exhaust Pressure: 25 PSIG MAX
Speed: 4,000 RPM MAX
Steam Inlet: 2"–250# ASA FLG.
Exhaust: 6"–150# ASA FLG.
Weight: 1,200 LB

Here's the new De Laval HCB Single Stage Turbine which is now "on the shelf" . . . ready for immediate shipment. This mechanical drive turbine is simple, rugged, designed for long economical life and low maintenance. For example, note the true centerline casing support, the replaceable governor, the removable steam strainer. Investigate all the advantages of this versatile driver. It is ready to handle—*at low cost*—a variety of applications in your plant.

Send for new Bulletin 4206
which gives vital facts and figures

DE LAVAL *Mechanical Drive Turbines*

DE LAVAL STEAM TURBINE COMPANY
810 Nottingham Way, Trenton 2, New Jersey

DL205

Only Carlon*

FOR SALT WATER DISPOSAL

Only CARLON Plastic Pipe effectively resists corrosion from salt water and other corrosive wastes. It is completely impervious to the effects of sulphurous waters, alkalies, sour crude and hydrochloric acid used to acidize disposal formations. Guaranteed forever against rot, rust and electrolytic action, CARLON Plastic Pipe successfully serves installations where ordinary metal pipe is continually replaced.

Extremely lightweight (only 1/8th as heavy as steel), CARLON can be installed in less time and with less effort. It is supplied in long lengths which require fewer fittings per installation. Permanent, leakproof connections can be made to existing metallic lines by means of plastic fittings and without special tools.

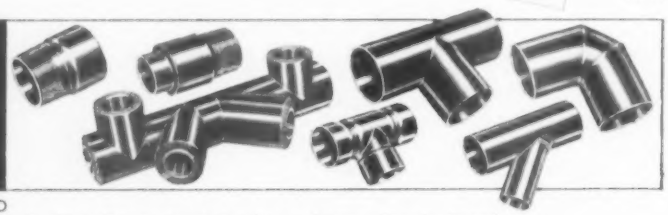
For economical salt water disposal piping that *lasts* . . .
specify CARLON Plastic Pipe. *Write today for literature.*

* The First REAL PIPE that is Plastic! • BUY THE PIPE WITH THE STRIPE!

1396-CP

CARLON PRODUCTS CORPORATION

Pioneers in Plastic Pipe



10201 MEECH AVENUE • CLEVELAND 5, OHIO
CARLON plastic pipe is produced in Texas, Colorado, Ohio, Oregon, North Carolina and Acton, Ontario, Canada.

PIPE LINES

New Line Delayed

New bids on Yellowstone products carrier sought

BILLINGS, Mont.—Completion date of the 540-mile, 10-in. products pipe line from Billings to Spokane was delayed until September 1954 when Continental Pipe Line Co. rejected bids for construction of the line last week.

Continental, which will direct construction of the line through the staff of the newly organized Yellowstone Pipe Line Co., called for new bids September 8 after moving the completion date up several months.

Necessity for cutting timber and clearing much of the right-of-way was blamed for the "premium" bids submitted by the 32 contractors who sought portions of the project. The delayed completion date, which will give contractors ample time to clear right-of-way well ahead of pipe-stringing crews, is expected to solve the problem.

Ownership of the $20,000,000 pipe line will be shared by Continental Oil Co. and Interstate Oil Pipe Line Co., principal owners, and Union Oil Co. of California and the H. Earl Clack interests. A Continental official said present ownership is Continental, 42 per cent; Interstate, 42 per cent; Union Oil, 10 per cent; and the Clack interests, 6 per cent.

FPC Approves Laying 7,123 Miles of Gas Lines in 1953

WASHINGTON.—The Federal Power Commission authorized the construction of new natural-gas facilities aggregating $723,037,744 during the fiscal year ended June 30, a figure exceeded only by certificates issued in fiscal 1951.

The commission issued 133 certificates during the year calling for the construction of 7,123 miles of line and 582,715 hp. in compressor units. The 1951 record was 173 certificates for 8,695 miles of line and 736,135 hp. in compressor units to cost $725,432,984.

Although there were three fewer certificates issued than in 1952, the line mileage and cost of the 1953 certificates will be more than double the 3,378 miles and $321,919,895 cost covered by the 1952 certificates.

The higher 1953 totals were due to the fact that 44 certificates covered large projects aggregating 6,684 miles of line and 561,310 compressor horsepower to cost $706,607,251, including the $175,250,000 El Paso Natural Gas Co. line from Texas to California, and the $129,541,000 Gulf Interstate Gas Co. line from Louisiana to Kentucky.

South Carolina G. & E. Lets Contract for 160-Mile Line

TULSA.—South Carolina Gas & Electric Co. has contracted with Williams Brothers Co. here for the laying of a 160-mile natural-gas line connecting with Transcontinental Gas Pipe Line Corp.'s system near Aiken, S. C., and running through Summerville to Charleston, S. C.

The new system, which will consist of 10, 12, and 16-in. pipe, will include a branch line to Columbia, S. C. Presently, Williams Brothers is putting in two spreads this month with the expectation of completing the entire project by January 1.

Equitable Plans New Gas Lines, Compressor Station

PITTSBURGH.—Equitable Gas Co. here plans to construct about 12 miles of line and a compressor station in connection with activating Logansport pool in Wetzel and Marion counties, West Virginia, for natural-gas storage.

Plans include construction of a 1,320-hp. compressor station, a 9-mile, 12-in. gas line, and about 1.8 miles of 6-in. and 0.7 miles of 8-in. well-connecting lines. The lines will carry an estimated 59,500,000 cu. ft. of gas daily from the storage field, which will have a capacity of 3,023,000,000 cu. ft.

The entire project, which received Federal Power Commission approval recently, will cost an estimated $2,217,400.

Permian Completes Half Of 285-Mile Gas Line

MIDLAND, Tex.— Permian Basin Pipe Line Co. reached the half way point last week in its construction of a 285-mile natural-gas line connecting Spraberry Trend and New Mexico producing areas with El Paso Natural Gas Co.'s system in Yoakum County, Texas.

Crews laying 30-in. pipe between Midland and Denver City, Tex., met last week as crews operating in New

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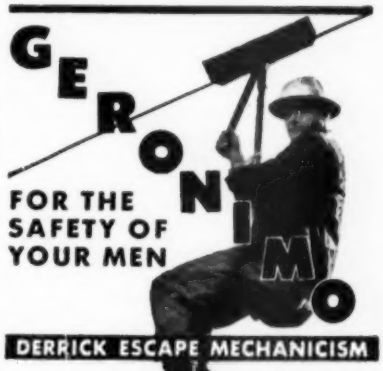

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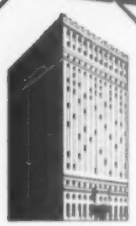

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Mexico completed the transmission line from that state to Yoakum County. When the entire project is completed in December, the new transmission system will transport 300,000,000 cu. ft. of gas daily to Yoakum County. There El Paso will carry the gas to Dumas, Tex., where Northern Natural Gas Co. will pick it up with another new line and transport it to midwestern states.

The combined construction programs of these three companies for movement of this gas will cost approximately $100,000,000 *(The Oil and Gas Journal, May 11, page 163).*

Southern California Finishes Two New Booster Stations

LOS ANGELES. — Southern California Gas Co. has completed two booster stations to aid in handling increased deliveries over the Texas-California natural-gas line now being expanded.

The stations, located at Cactus City and Desert Center, Calif., will increase the line's capacity to 530,000,000 cu. ft. daily. With the addition of two compressors at the company's Blythe, Calif., station, the capacity will be raised an additional 25,000,000 cu. ft.

The gas will be received at the Blythe station from El Paso Natural Gas Co., which is constructing a 771-mile, 30-in. line to deliver about 400,000,000 cu. ft. of gas daily from West Texas and New Mexico fields to California. From Blythe, Southern California and Southern Counties Gas Co. of California will transport the gas to their respective systems over a proposed 73-mile, 30-in. line.

The two California companies plan to spend about $40,000,000 on expanding their pipe-line facilities to receive the additional gas.

P.G.&E. Plans New Gas Line

WASHINGTON. — Pacific Gas & Electric Co., San Francisco, has filed an application with the Federal Power Commission seeking authority to construct a 11-mile natural-gas line in the Pittsburg, Calif. area.

About 10½ miles of the 24-in. line will connect the company's Antioch control station with its steam electric plant, now being constructed here. The remainder of the proposed line will tie in the control station with the Standard Pacific Gas Line, Inc., transmission line at Stoneman to assure uninterrupted service to that firm's system.

The new line, which will cost about $992,800, will have an initial capacity of approximately 156,000,000 cu. ft. of gas daily.

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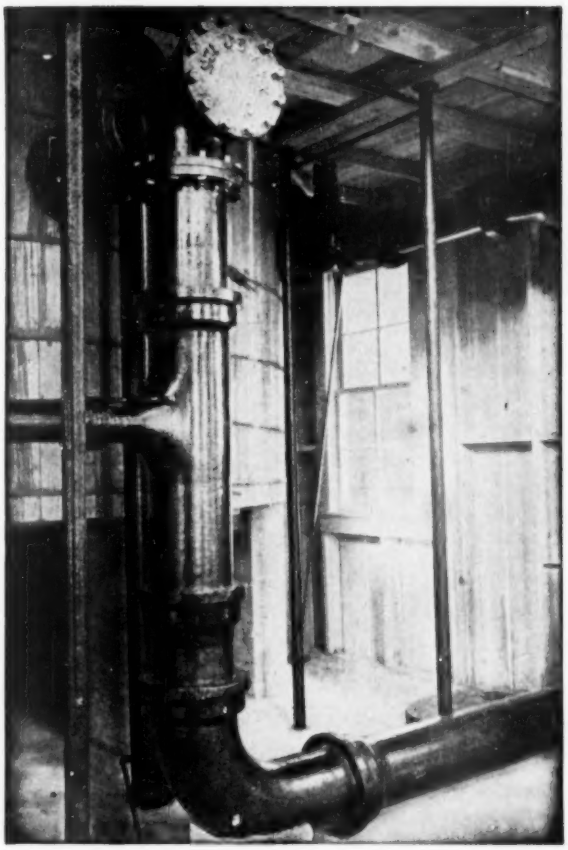

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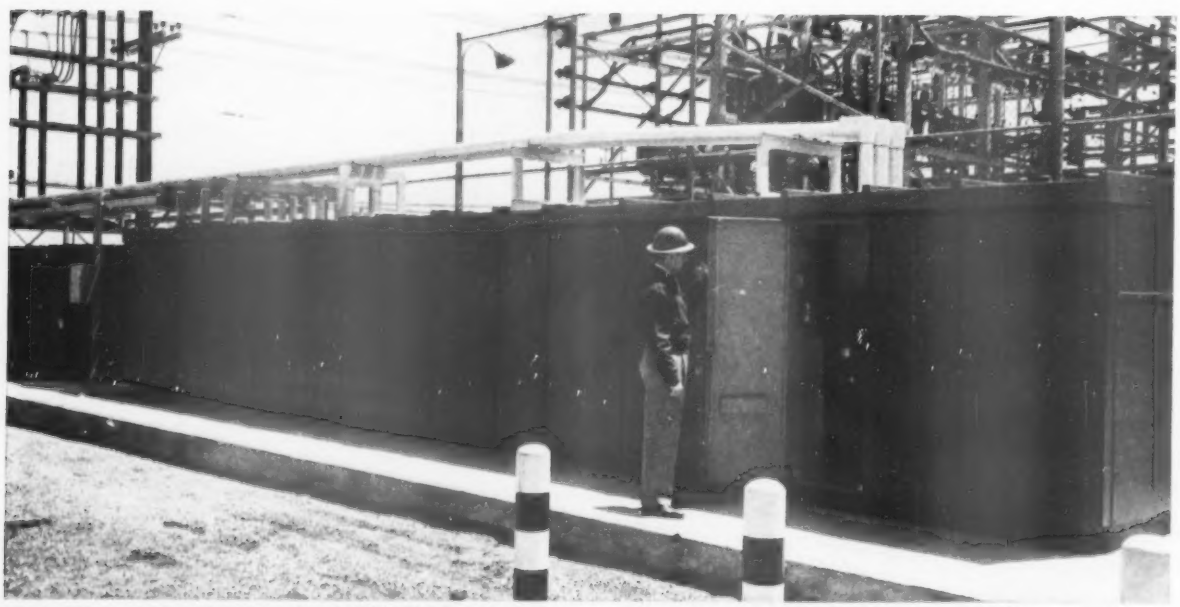
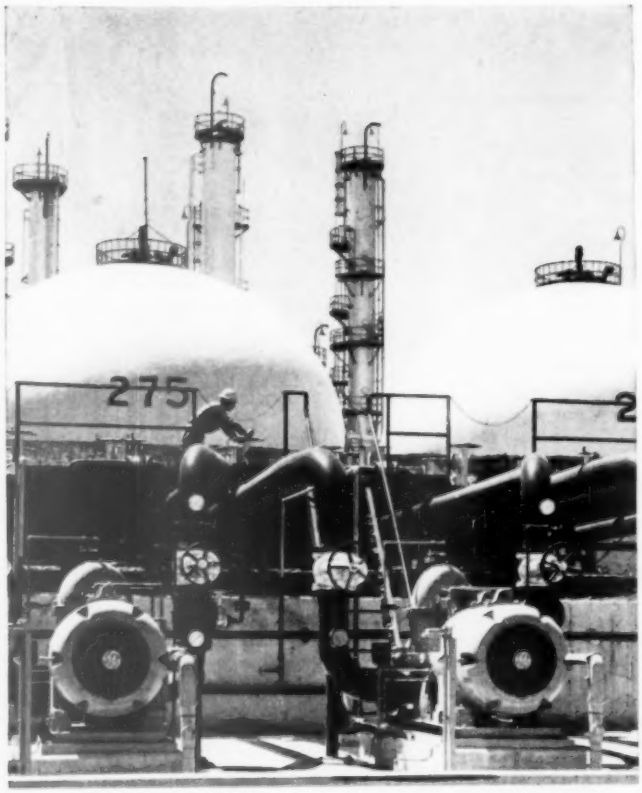


COMPACT, OUTDOOR METAL-CLAD SWITCHGEAR in foreground is the main distributing point of power to Union Oil's Wilmington refinery. Providing primary circuit protection, these compact G-E units are factory-assembled and shipped ready to install. They're simple to operate and maintain because of a fast, vertical-lift system of breaker removal.



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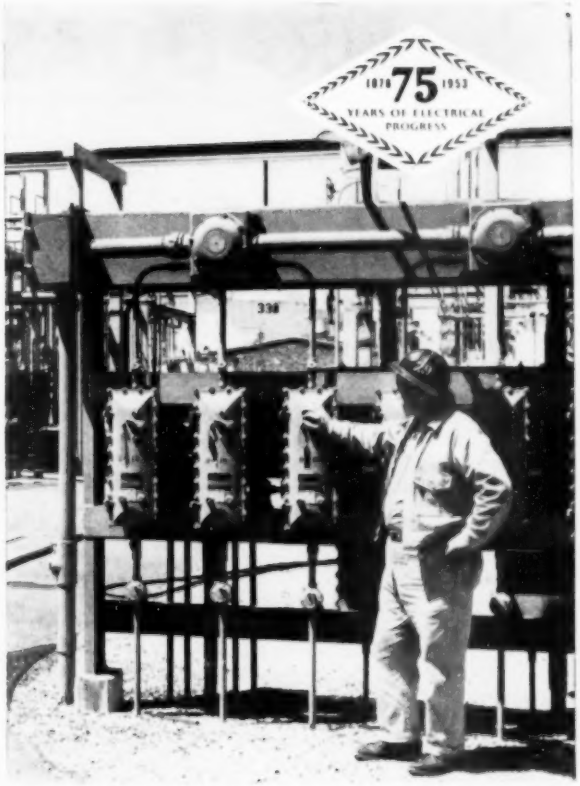

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Two new topping units at Union Oil's Wilmington refinery kept on-stream by G-E power and drive equipment

Recently, the Union Oil Company wound up a $27,000,000 expansion program at their Wilmington, Calif. refinery by putting two new 20,000 bbl.-per-day topping units and the nation's largest vacuum flasher into action.

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NATURAL GAS

Gas to New England

Algonquin delivering after struggle lasting 2½ years

WASHINGTON. — Algonquin Gas Transmission Co. began natural-gas deliveries to its New England markets last week marking the end of 2½ years of court battles and Federal Power Commission hearings.

However, the company probably still has one more court fight which involves a $450,000 damage suit brought by Clifford McEvoy, a New Jersey real estate man, who charges that Algonquin has not completed grading operations on his properties in Bergen and Passiac counties, New Jersey.

Recently McEvoy obtained a temporary injunction barring the company from making deliveries to Boston on the grounds that it would be unsafe to work on the line while gas was being transported through it. But Federal Judge Alfred E. Modarelli lifted the restraining order when Algonquin proved the grading operations could be carried out safely while gas was going through the 249-mile line.

FPC rule disputed . . . Though this injunction blocked deliveries a short time, the most devastating delay was caused by Northeastern Gas Transmission Co. in February 1952. The latter obtained a restraining order stopping Algonquin from completing its transmission line for 1½ years, and forcing FPC to reopen hearings on who should be allowed to supply New England markets.

The controversy began in late 1950 when Northeastern was granted FPC authority to supply only half of the New England territory, which included Connecticut, Massachusetts, New Hampshire, and Rhode Island. The company had applied to supply the entire four-state area. A few weeks later FPC gave the other half to Algonquin.

During 1951 Algonquin went ahead laying pipe lines and making arrangements with its parent, Texas Eastern Gas Transmission Co., for needed gas supply, while Northeastern attempted to get the FPC to reopen the hearings. Northeastern submitted a new application seeking the entire disputed area. However, the new request was dismissed and a rehearing denied. Then Northeastern appealed its case to the courts on the grounds that it was not given a full hearing and got its injunction.

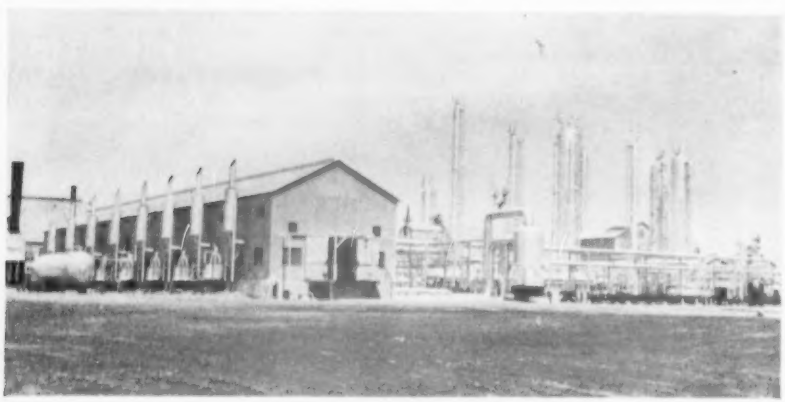
When the injunction was granted, Algonquin lacked only 24 miles of completing its transmission system. The company sought relief from the restraining order, but the Supreme Court in October 1952 upheld the lower court's decision *(The Oil and Gas Journal, October 20, 1952, page 88).*

Next Algonquin tried to get the FPC to issue it a temporary certificate of necessity to complete its transmission line. But the commission ruled that it did not have the authority. In January 1953 the U. S. Court of Appeals here upheld the FPC ruling.

Setback in New York . . . Almost simultaneously the company suffered another setback in the courts. This one came from the New York Supreme Court, which decided that the FPC certificate of convenience originally issued Algonquin was faulty, and canceled a condemnation-rights order given the firm in July 1952. The latter order gave Algonquin permission to lay 2½ miles of 26-in. pipe in Westchester County, New York, over the protests of 11 landowners. The Supreme Court ruling forced the company to take up this pipe and restore the land to its original state *(The Oil and Gas Journal, January 19, page 147).*

The FPC hearings dragged on from late 1952 to last month. In July the companies submitted a compromise offer which was similar to the FPC order dividing the area between the two companies. The major difference was that Algonquin would give Northeastern the Pawtucket, R. I., market in exchange for Worcester Gas Light Co.'s Framington division. This proposal was accepted by the commission *(The Oil and Gas Journal, August 17, page 183).*

Now both companies have started deliveries to their respective markets. It is not known how much the delays have cost Algonquin, but originally the company planned to spend about $40,000,000 on its pipe-line project, and completed it at a cost of over $56,000,000.



Elk Basin Plant Producing Block Sulfer

Stanolind Oil & Gas Co.'s Elk Basin unit plant in Wyoming processes 12,000,000 cu. ft. daily of casing-head gas containing about 18 per cent hydrogen sulfide. From the gas the plant extracts about 74 long tons of sulfur daily. Molten sulfur flows into huge vats where it cools and is stored in solid blocks. In addition to sulfur, the plant turns out approximately 56,000 gal. per day of propane, butane, and natural gasoline.

Laclede Asks Eminent Domain Right for Storage Project

ST. LOUIS.—Laclede Gas Co. is seeking Missouri Public Service Commission permission to exercise the right of eminent domain, where necessary, in establishing a natural-gas underground-storage project northwest of here.

The company plans to store the gas in St. Peter sandstone at a depth of 1,500 ft. under approximately 25,000 acres. Company officials have pointed out to residents and landowners in the sector that test drilling has gone below 3,000 ft. and no further traces of oil or gas have been found. Last July, while drilling some of these tests, traces of oil were found in Trenton limestone about 400 ft. above the proposed reservoir bed.

Carbon Black Plant Planned

SANTA ANNA, Calif.—Lynn Carbon Black Co., Inc., plans to construct a carbon black plant 18 miles south of here in Coleman County.

The new plant, which will have a capacity of 500,000 cu. ft. daily, will process all gas from a 3,500-acre block in that area.

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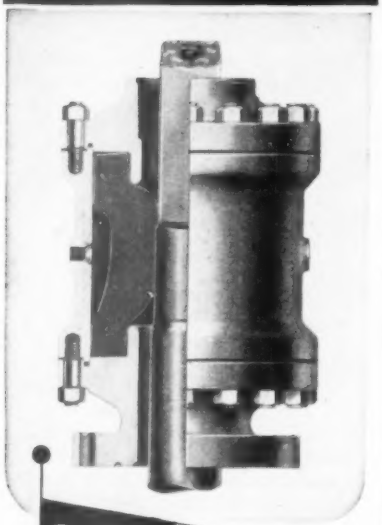

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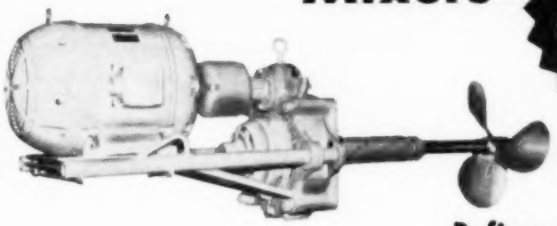

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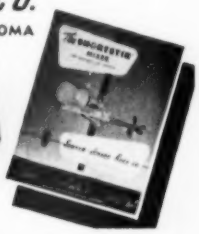

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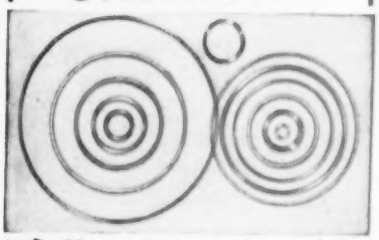

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REFINING

Crown Central Gets Tax Write-Off for Reformer

WASHINGTON. — Certificates of accelerated amortization of a 5,000-bbl. per day catalytic reformer to be installed at its 25,000-bbl. refinery near Houston at a cost of $1,495,000 have been issued to the Crown Central Petroleum Corp. by the Office of Defense Mobilization.

The company was granted 5-year write-off of 100 per cent of $294,000 for specialized facilities for aviation-gasoline production, 65 per cent of $1,006,000 for basic refining facilities, and 45 per cent of $195,000 for auxiliary facilities.

New Catformers on Stream

NEW YORK.—United Refining Co. has commenced operation of a new 2,500-bbl. per day Catformer at the company's 5,500-bbl. per day refinery here. The plant was built by the chemical-plants division of Blaw-Knox Co., Pittsburgh.

Another Catformer, with a capacity of 1,000 bbl. per day also went on stream recently at the 6,000-bbl. per day refinery of Husky Oil Co. at Cody, Wyo. This unit, built by Grebe & Doremus, incorporates facilities for stripping hydrogen sulfide from the hydrogen-rich recycle gas. It is the first Catformer to be so equipped. Both units are licensed by Atlantic Refining Co.

Bay Expands Denver Refinery

DENVER. — Bay Petroleum Corp. has completed a multimillion-dollar expansion and modernization program which increased the crude charge capacity of its refinery here from 6,500 bbl. to about 12,000 bbl. daily.

The project included the installation of a new 3,528-bbl. fluid cat cracker and revamping of other units. Revamped facilities included a crude topping unit, a visbreaker - vacuum unit converted from a Dubbs thermal cracking unit, and gas concentration and polymerization units.

Refining Briefs

DUNCAN, Okla.—Sunray Oil Corp. plans to install a 5,000-bbl. Platformer at its refinery here. Contract for the Universal Oil Products Co. unit is expected to be let late this month with construction started January 1. The company hopes to have the $1,000,000 project completed in mid-1954.

SUNBURST, Mont.—A new catalytic polymerization unit, with a rated capacity of about 105 bbl. per day of polymer gasoline, will be built by The Texas Co. at its 8,000-bbl. per day refinery here, according to E. I. Scheibe, superintendent. Construction will begin shortly, and completion of the new unit is scheduled for late this year. Included in the Sunburst project

NELSON REFINERY CONSTRUCTION INDEX

Appears in the first issue each month.
Explanation—"News Items that Appear in Quarterly Cost Indexes," July 7, 1952, pages 105 and 106.
Compiled by W. L. Nelson—Petroleum Refinery Consultant—Tulsa.
Indexes of Individual Equipment Items—January, April, July, and October.

Index (1946 = 100)

	1948	1949	1950	1951	1952	May 1953
Pumps, compressors, etc.	127.0	135.9	138.2	155.9	155.6	158.8
Electrical machinery	127.6	130.9	134.9	154.3	152.4	155.0
Internal combustion engines	116.9	124.8	126.0	146.1	146.5	147.8
Instruments	120.0	122.0	127.8	142.3	146.2	148.1
Heat exchangers	130.0	133.0	140.0	152.0	165.8	172.4
Miscellaneous equipment average	*122.1	*121.6	*126.2	*145.1	153.3	156.4
Materials component	139.3	143.6	149.5	164.0	164.3	169.7
Labor component	128.0	137.1	144.0	152.5	163.1	170.4
Refinery construction index	132.5	139.7	146.2	157.2	163.6	170.1

*Used in computing the Nelson Index until April 1952. These are slightly different than the average of the Miscellaneous Equipment Items shown above.

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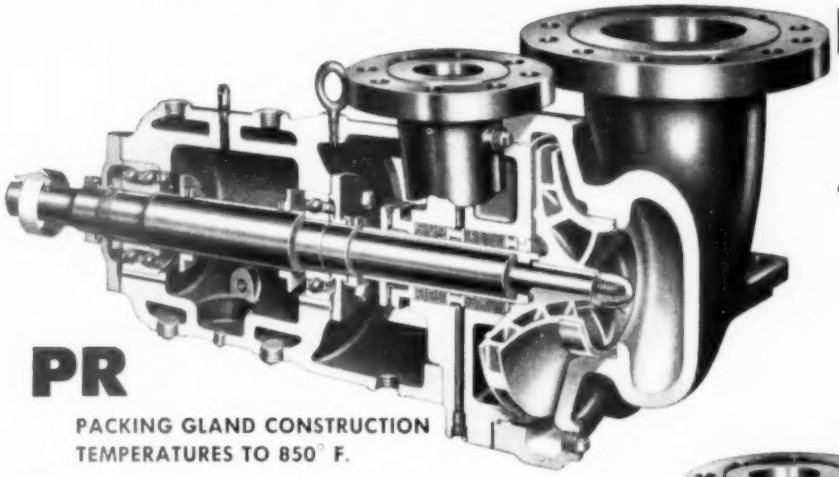

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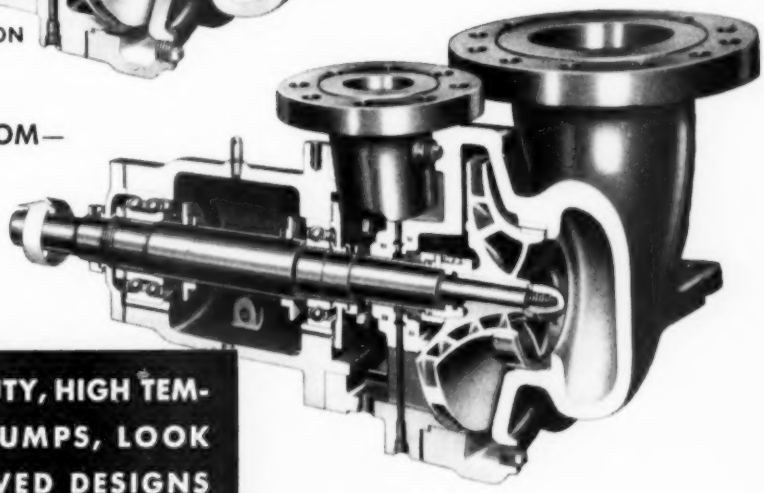

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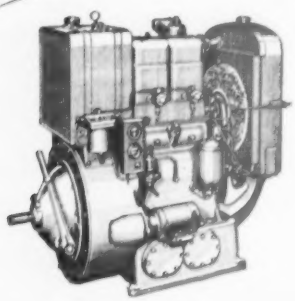

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are an extension to the pump house, and new exchangers, condensers, coolers, and pumps.

NEW YORK.—The deck of the article "Wire Mesh Removes Liquids From Refinery Vapors," *(The Oil and Gas Journal, August 10, page 117)*, stated that the knitted wire-mesh entrainment separator will remove 95 per cent or more of liquid entrained in the gas. Actually the record is better than 99 per cent.

Petrochemicals

A.C.S. to Discuss Petrochem Progress at Annual Meeting

CHICAGO. — Postwar progress in petrochemicals will be surveyed in a 2-day symposium to be held here this week at the national meeting of the American Chemical Society.

Among the 20 papers to be presented is one on "The Scope and Growth of the Petrochemicals Industry," by R. L. Bateman and J. A. Field of Carbide & Carbon Chemicals Co., New York. Others will deal with such specific petrochemical fields as raw products for organic chemicals, Fischer-Tropsch chemicals, ammonia, aromatics, surfactants, detergents, etc.

In another session the Petroleum Division of A.C.S. will join with the Division of Analytical Chemistry on the subject of automatic analytical methods in the petroleum industry.

Sales of Detergents Rising

NEW YORK.—This year for the first time, sales of synthetic detergents will exceed soap sales on the bases of both weight and dollar income, according to the Association of American Soap and Glycerine Producers.

The association has reported first half sales of syndets at nearly $206 million, up 30 per cent from the first half of last year. During the same period sales of liquid and solid fatty acid soaps declined.

Total production figures derived from a census of 85 producers, showed detergent sales of 902,307,000 lb., up 25 per cent from the same period in 1952, while soap production slid 17 per cent to 809,595,000 lb. Total soap and detergent sales are up slightly.

Two years ago, over half of the synthetic detergents produced in this country were derived from petrochemical sources, and this class is still gaining.

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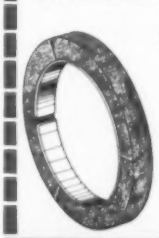

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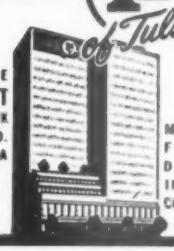

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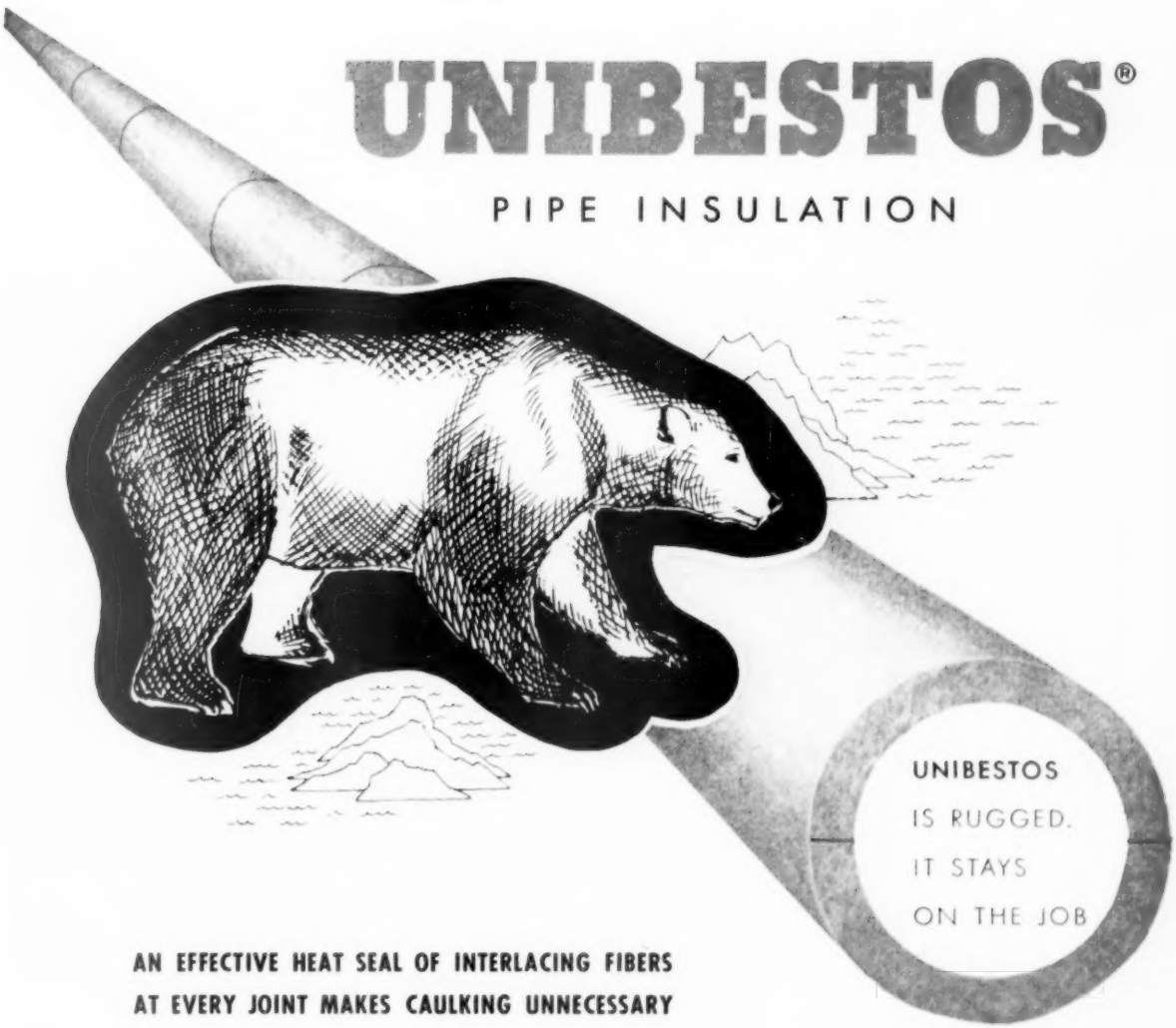

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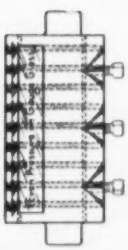

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Among the Drilling Contractors

Kansas Drilling Firm Forms New Ownership

Leo R. Fortier and Wayne W. Wright have acquired the interest of their partner, S. J. Buffington, in Crest Drilling Co., Wichita, Kans., and will operate as Fortier-Wright Drilling Co. Don Jones, Augusta, Kans., who also has an interest in the new company, will supervise field operations. Crest Petroleum, Inc., with which Buffington also has been associated with Fortier and Wright, is unaffected by the reorganization of the drilling company. Both companies will continue to maintain joint headquarters.

California Firm Adds Rig

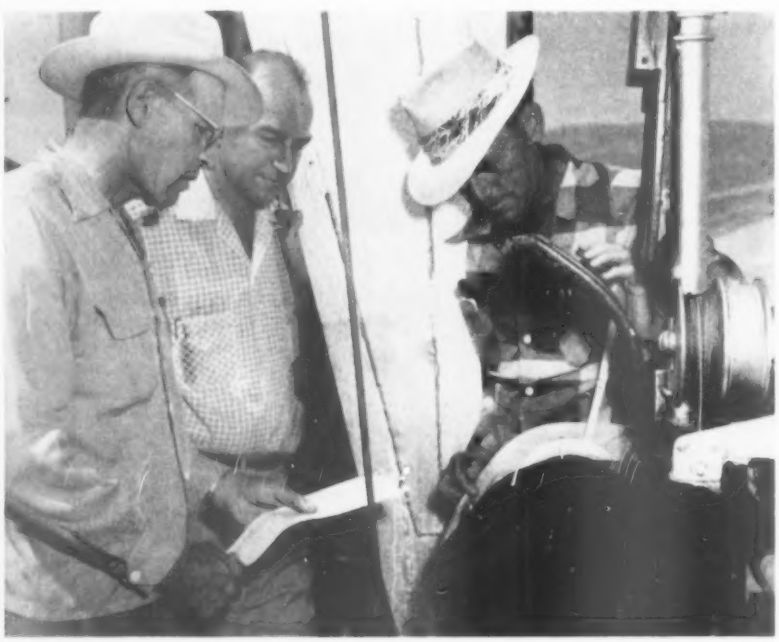
Casey & Montgomery, Bakersfield, Calif., a contracting partnership formed last April, will use a newly acquired National 50-A rotary rig to drill a test contracted for Richard S. Rheem on the Portals lease at Race Track Hill, near here. The new rig is the second for the partnership, and the Rheem test will be its first. It has 450 hp. on the draw works and 750 hp. on the pumps and is rated to drill to 7,500 ft.

Delta Companies List 14 Rotary Rigs Active

Delta Drilling Co. and its associated company, Delta Gulf Drilling Co., Tyler, Tex., report 14 rigs working, 8 by the former and 6 by the latter.

Delta Drilling lists two rigs running in East Texas, one for Sun Oil Co. and Delta Drilling Co. on a semi-wildcat test west of the Hitts Lake field in Smith County, and the other on a deepening job for Columbian Fuel Co. in Camp County; one on the Texas Gulf Coast, at Big Hill, Jefferson County, where it is drilling for the company's own account and associates; one on a wildcat for itself in Rooks County, Kansas; two in Webster Parish, northern Louisiana, one for itself and Hunt Oil Co. at Cotton Valley, and the other for itself at Sibley; one for Union Oil Co. in Converse County, Wyoming; and one for itself and California Co. in the Rose Hill area, Lycoming County, Pennsylvania.

Locations of Delta Gulf's rigs are:



T. T. Nudson (left), drilling supervisor, Pacific Western Oil Corp., and Latham Conner (right), tool pusher, Clyde Hall Drilling Co., contractor, check the progress on Pacific Western's latest test drilling on the Belgian Anticline at McKitrick, on the west side of San Joaquin Valley, California. Looking on is Gordon Wilmovsky (center), store manager for Bethlehem Supply Co. at Taft, Calif.

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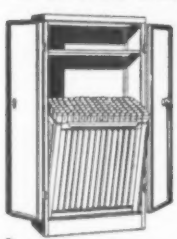

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Two in Schleicher County, West Texas, one being in the Hulldale field where it is drilling for the company and associates, and the other on a wildcat being drilled for itself and W. H. Hunt 14 miles northwest of Eldorado; one in the Reka Pettit field, southeastern Navarro County, East Central Texas, on contract to Lawton and associates with Delta holding an interest; two on the Louisiana Gulf Coast, one on contract to Cole and associates in the Indian Bayou area, Vermilion Parish, and the other drilling for J. Ray McDermott & Co., Inc., and Paul F. Barnhart in the Durald area of Evangeline Parish; and one in Mercer County, North Dakota, where it is working for Williston Oil & Gas Co.

The rig in the Hulldale field, Schleicher County, West Texas, recently completed its seventeenth oil producer in the field, discovered by Delta Gulf and associates in October 1950.

Armstrong & Horn tools are being used by Corpus Christi Refining Co. on a new wildcat test being drilled 5 miles northwest of Victoria, in Victoria County, on the Texas Gulf Coast. Location of the test, 1 Schusteret, in the J. D. Wright Survey, is about a mile west of the one-well DePine gas field.

Newman Brothers Drilling Co., San Antonio, has contracted for an 8,750-ft. test to be drilled for Rowan & Hope in the La Copita field, 25 miles northeast of Rio Grande City, in Starr County, southwestern Texas. Present production in the field is from Frio and Vicksburg sands above 6,800 ft. The new deep test is 4 Bentsen Brothers.

Hinkle Drilling Co., Houston, has a new 12,000-ft. test under way for Gulf Refining Co. in the South Bell City area of Calcasieu Parish, coastal Louisiana. It is Gulf's 1 Arvin Fontenot, in 16-11s-6w.

ACTIVE ROTARY RIGS*

Area—	Week ended 8-31-53	Change week ended 8-24-53	Change week ended 9-1-52
Gulf Coast	531	—50	+ 46
N. & W. Tex.-N. M.	795	+13	+ 51
Ark.-N. La.-E. Tex.	183	+37	+ 50
Oklahoma	367	+ 4	+ 65
Kansas-S. Nebraska	155	— 3	+ 9
Illinois-Eastern	148	+ 5	+ 13
Rocky Mountains	258	0	+ 8
Pacific Coast	173	+ 6	+ 16
Total U. S.	2,610	+12	+258
Western Canada	173	0	+ 7
Total	2,783	+12	+265

*Courtesy Hughes Tool Co. Trends in drilling activity in the United States, Rocky Mountains, and western Canada are shown on pages 187 and 188.

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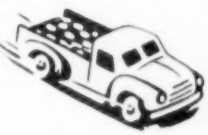

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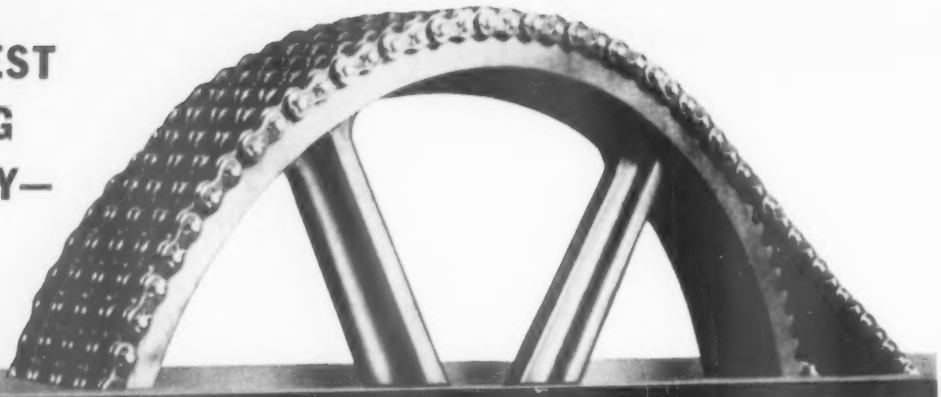

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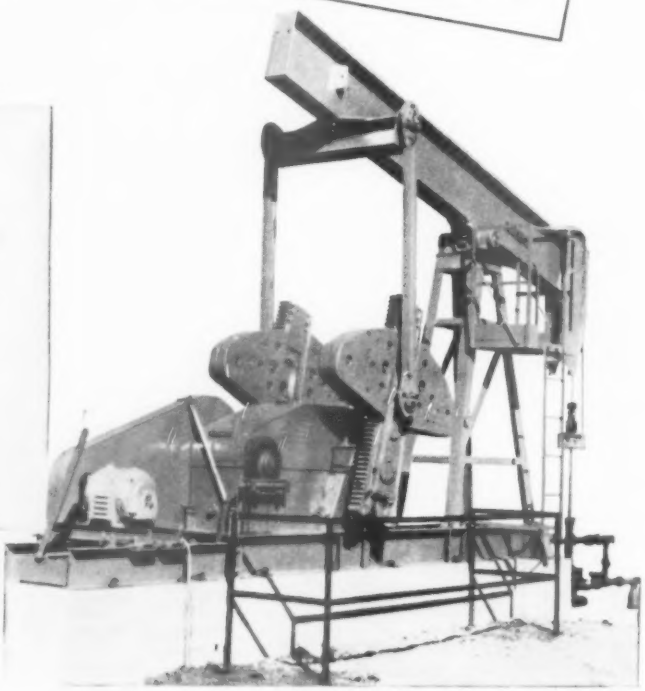


DIAMOND ROLLER CHAINS

EXPLORATION

Oil on Anadarko Shelf Jumps West

by Philip C. Ingalls

THERE'S a growing regard for the potentialities of the Ordovician-Simpson sands on the northern shelf of the Anadarko basin of North-Central Oklahoma and the southern portion of the Sedgwick basin of South-Central Kansas.

Union Oil Co. of California 1 Simpson unit (arrowed on map), northwest Grant County, Oklahoma, is an assured discovery in the Simpson. The well flowed 42°-gravity oil at a rate of 35 bbl. an hour for 2 hours on a drill-stem test at 5,255-68 ft.

This discovery, on a seismograph-located structure, is 15 miles southwest of the nearest Simpson production in Kansas (Caldwell field) and about 25 miles northwest of the nearest Simpson production in Oklahoma (East Pond Creek and Rich Valley fields). Excepting Northwest Hillsdale (an abandoned two-well Simpson pool about 30 miles to the southeast) Union's discovery is farther west than any previous Simpson production on the northern shelf.

As shown on the sketch, the northern shelf of the Anadarko basin is that area of Oklahoma lying immediately to the west of the Oklahoma portion of the Nemaha granite ridge (Nemaha range), which plunges southward out of Kansas. Along this highly faulted range, which was uplifted during early Pennsylvanian time, basement rocks are found hundreds of feet above regional levels. Some of Oklahoma's most prolific oil fields are on structures along this buried range.

It was events which took place prior to early Pennsylvanian time that set up the northern shelf area as a potential oil province, however. Prior to Mississippian time at least once, probably more often, the west-northwestward trending Chautauqua arch (a westward continuation of the original Ozark dome) was uplifted. This arch extended across what is now the northern limit of the northern shelf causing nondeposition and erosional unconformities in the area of the shelf. The most prominent erosion period now recognizable occurred in Devonian time when all pre-Mississippian rocks were tilted to the southwest and beveled. This truncation left a broad band of exposed Simpson running across a

Arrow points to location of a Simpson discovery west of Ordovician production on the northern shelf of the Anadarko basin.

portion of the shelf area, which was subsequently overlapped by Mississippian rocks. It is this Simpson band that is the principal objective through the northern shelf area. Though the Simpson in this area is thinner than at its greatest development south of Oklahoma City field in the Golden Trend area, it is found at shallower depths and has adequate porosity, especially north of the wedge edge of the younger Ordovician-Viola.

The search for Simpson on the northern shelf is a search for structure even though the truncated Simpson sands offer stratigraphic traps which play a part in the accumulations found or to be found. The complex depositional and structural history of this area resulting from two major uplifts which are nearly at right angles to each other has made prospecting extremely difficult. Even the long-recognized and intensely prospected Nemaha range has big structures that have defied interpretation. That fact was emphasized by Macmillan Petroleum Corp.'s high Ordovician discoveries only a few miles north of West Edmond field during the past few months.

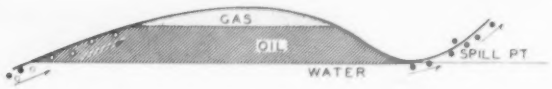
Oklahoma's oil potentialities appear inexhaustible. Areas which began booming during the surface exploration days of the years before the twenties have continued to be active ever since. First here and then there a strike is made and a local boom sets in. The areas around such well-known old fields as Burbank and Cushing are still being actively prospected. The Kendrick area, just southeast of Cushing, where more than 100 big Pennsylvanian (Oswego and Prue) oil wells have been completed since a Prue discovery was made last January, is but a sample of the remaining potentialities of established producing areas. And, in addition, the state still has wide-open spaces such as the western portion of the Anadarko basin's northern shelf.

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

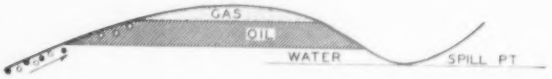
NEW MEXICO . . . Stanolind Oil & Gas Co. 1 State of New Mexico "AB," Eddy County wildcat, has been completed as a gas well from the Pennsylvanian sand at a plugged back depth of 10,270 ft. Nearest production of anything near this well's producing depth is about 30 miles to the northeast in Anderson Ranch field, Lea County. The discovery flowed 30,000 M.c.f. of gas per day, absolute open flow, plus an estimated 26 bbl. of distillate per 1,000 M.c.f. of gas.

WYOMING . . . Stanolind Oil & Gas Co. 1 Cottonwood Creek Unit, C SW SW 2-47n-91w, Washakie County, pumped 184 bbl. of oil in 20 hours on initial production gage through perforations at 7,270-94 ft. in the Phosphoria.

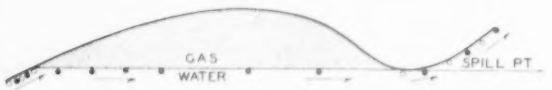
OKLAHOMA . . . Union Oil Co. of California is preparing to core more sand at 1 Simpson, Grant County Simpson discovery in NE NE SE 29-29n-6w. Total depth is 5,268 ft. with casing set at 5,255 ft. A drill-stem test prior to setting the casing flowed gas in 3 minutes and oil in 56 minutes. The well flowed for 2 hours an average of 35.3 bbl. per hour.



Stage 1 . . . Gas, oil, and water above spill point. Both oil and gas continue to be trapped while water is displaced. This stage ends when oil-water interface reaches the spill point.



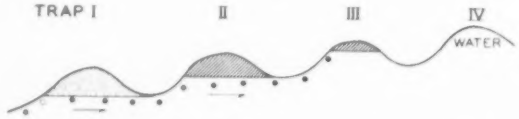
Stage 2 . . . Stage of selective entrapment and gas flushing. Gas continues to be trapped while oil is spilled up dip. This stage ends when oil-gas interface reaches spill point and coincides with the oil-water interface.



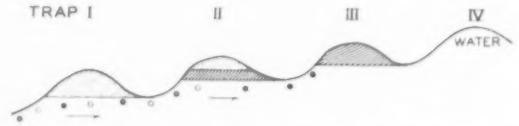
Stage 3 . . . End stage. Trap filled with gas. Gas spills up dip as more gas enters trap. Oil bypasses the trap and continues up dip.

Fig. 1—Diagrams illustrating migration and accumulation of oil and gas in a simple trap under static conditions.

A. Trap I is filled to the spill point and has a gas cap. Only oil is spilling up dip into Trap II. Traps III and IV are full of salt water and contain no oil or gas.



B. Trap I is completely filled with gas; all its oil has been flushed up dip into Trap II. Oil is now bypassing Trap I. Trap II is filled with oil and is spilling oil up dip into III; it still has no gas cap. Trap III has a little oil, while IV is still filled with salt water.



C. Trap I is unchanged with gas spilling up dip into Trap II. Oil is bypassing Trap I. Trap II now has a gas cap and is spilling oil up dip into Trap III. Trap III is now filled with oil but still has no gas cap. Trap IV is dry.

Fig. 2—Diagrams illustrating migration and accumulation of oil and gas in interconnected reservoirs.

Here's the NEW Concept of

Differential Trapping of Hydrocarbons

. . . It carries the structural theory of accumulation to its logical conclusion

by William C. Gussow

Factors which modify the accumulation are:

1. Hydrodynamic conditions in the strata, causing tilted water tables and slight spilling.

2. Faulting and seepage, allowing insignificant escape of gas and/or oil.

3. Depth of burial (capacity for a trap to hold gas is a function of pressure and increases with depth. Thus at 6,200 ft., reservoir is capable of holding 200 times its volume of compressed gas).

4. Regional tilt, causing insignificant spilling or decantation of a reservoir filled to the spill point.

5. The effect of temperature and pressure on the phase relationships of oil and gas, causing gas to go into solution in the oil or for solution gas to come out of solution and form a gas cap, etc.

Fundamental principles believed to control the migration and accumulation of oil and gas:

1. The effect of gravity on inhomogeneous fluids, causing oil and gas to migrate vertically upwards in a water environment.

2. Impermeability barriers and structural control, causing deflection and lateral migration and the final trapping of hydrocarbons.

3. The effect of differential entrapment caused by a succession of traps.

THE principle of differential entrapment of hydrocarbons explains the so-called "anomalous" occurrences of oil and gas in contiguous reservoirs. It explains why some apparently good structures are gas fields rather than oil fields and why others produce large quantities of salt water.

Furthermore, this concept explains why gas fields may occur in a down-dip position and produce little or no oil, while structures in an updip position produce oil with little or no gas, and others in a still farther updip position are water bearing. In reality, this concept carries the structural theory of accumulation to its logical conclusion.

Fig. 1 illustrates the various stages of accumulation of oil and gas in a simple trap under static conditions.

Oil and gas first segregate into two

layers above the water table in accordance with the law of gravity (Fig. 1, Stage 1). Once the oil-water interface reaches the spill point, a trap for oil no longer exists (Fig. 1, Stage 2) and any additional oil entering the trap would cause oil to spill updip from the now "filled" trap. Once the oil-gas interface has reached the spill-point level, it would theoretically coincide with the oil-water interface and become a gas-water interface as the last bit of oil escapes from the gas-filled trap (Fig. 1, Stage 3). The end point has now been reached and this represents the final stage in this specific trap. Under hydrostatic conditions, this would now be preserved for geologic time unless cut into by erosion or faulting, or affected by regional tilting.

As the capacity of the trap to hold gas varies with the pressure or depth of burial, the gas will be compressed with increased load, so that the gas-water interface will no longer be at the spill point and the trap would once more be able to hold more oil or gas. Conversely, if the load or depth of burial is reduced (by erosion), the gas expands spilling more gas (or oil) updip.

This fundamental principle can be applied to a series of interconnected traps as illustrated in Fig. 2.

These might represent a series of parallel and contiguous anticlinal axes or a succession of culminations along one anticlinal axis, or they might represent a succession of culminations on a barrier reef.

At first, oil and gas would accumulate only in the lowest trap (Trap I) until this is filled to the spill point: all other updip traps would be water bearing until the lowest trap is filled. Only when oil begins to spill updip from Trap I will any oil accumulate in Trap II. Note that there is no gas cap in Trap II at this stage (Fig. 2-A).

Further stages in selective trapping of oil and gas are illustrated in Fig. 2, B and C. Thus, Fig. 2-B shows the condition that might prevail when Trap I is completely filled with gas, Trap II is filled to the spill point with oil—still has no gas cap—and Trap III has a little oil, also with no gas cap.

Fig. 2-C shows conditions at a still later stage, and might represent conditions as they are now known at the Rimbey-Homeglen, the Pigeon Lake-Bonnie Glen, the Wizard Lake, and the Morinville reefs while Trap III (Fig. 2-B) might represent conditions at the Acheson and St. Albert reefs, all of which are culminations on the Barrier Reef trend of Alberta, Canada.

Many examples of this phenomenon have been discussed in the literature of the world and invariably they have been passed up as "beyond explanation." To mention a few examples the principle of differential entrapment would appear to explain the relationships in the following contiguous structures: (a) Little Lost Soldier (oil), and Wertz (gas) domes, Wyoming (II; 650, 663)*; (b) Geneseo and Edwards (oil), and the Lyons (gas) fields, Kansas (III; 229); (c) Sage Creek (salt water) and Winkleman (oil) domes in Wyoming (A.A.P.G. Bull. Vol. 31, 814); (d) Salt Creek (oil only) and Teapot (oil with gas cap) domes, Wyoming (II; 195); (e) East Coalinga Extension field (oil with gas cap in northern culmination and oil only in southern culmination), California; as well as many other examples in Texas, Oklahoma, Louisiana, Montana, Colorado, Kentucky, etc.

THE AUTHOR

W. C. Gussow, formerly exploration manager and chief geologist for Shell Oil Co. of Canada, Ltd., is now a consulting geologist and engineer in Calgary, Alta.

Multiple factors are believed to control and modify the migration and accumulation of oil and gas. The behavior of hydrocarbons under hydrodynamic conditions has been masterfully demonstrated by M. King Hubbert, explaining tilted water tables and flushing of shallow traps (A.A.P.G. Distinguished Lecture Series, 1952). Tilts up to a maximum of 800 ft. per mile are known (the average is about 100 ft. per mile), and while much greater tilts and anomalous, effects are readily demonstrated in the laboratory, they have so far not been found in nature. If hydrodynamic conditions actually existed such as to cause flushing of oil from a reservoir, the result would be to cause the oil to migrate down dip and accumulate in a downdip position. This is exactly the reverse to the "anomalous" conditions we find in nature.

It has been clearly demonstrated that faulting and fracturing do permit the escape of hydrocarbons. Many oil and gas seeps which occur in nature support this fact. However, a great many seeps are the results of lack of closure or a good seal. It is rather remarkable what little effect later faulting and fracturing have on most accumulations. They do have a modifying effect but cannot explain the so-called anomalous occurrences.

Regional tilt and resulting decantation has also been put forward to explain the "anomalous" occurrences. Without doubt this is a factor to be considered and there is no denying that it does occur. It is merely a matter of the degree to which it is effective. For example, the regional tilt in Alberta might affect accumulations in the Nisku (D2) but could not account for the effects seen in the Leduc (D3) reefs. (The regional tilt in Alberta in the vicinity of the Barrier Reef trend would be the equivalent of sliding a thin dime under the edge of a full bowl of soup having a 5½-in. diameter base).

Finally, some gas caps are undoubtedly the result of solution gas which has escaped from the oil with decrease in pressure as the oil migrates or spills up dip into structurally higher traps, or as the reservoir is brought closer to the surface by erosion.

The principle of differential entrapment is based on the assumption that oil and gas migrate over great distances and that adequate source beds occur in a large downdip supply basin. No doubt source beds within an individual structure will contribute hydrocarbons but local sources are not considered adequate to form commercial accumulations. This new concept would appear to remove one of the strongest arguments raised against distant migration or in support of a local origin.

A detailed manuscript is being prepared for publication in the Bulletin of the A.A.P.G. showing illustrations of the many examples of this phenomenon that have been described in the literature.

*References in parentheses, thus (II; 650) are to the volume and page number of Structure of Typical American Oil Fields (American Association of Petroleum Geologists.)

OKLAHOMA

Apparent Oil Strike Looms in Texas County

United Producing Co., affiliate of Union Carbide, reports an apparent oil discovery in Texas County in the Oklahoma Panhandle, 4 miles east of Cimarron County's new Keyes sand gas area.

The 1 Kelly, C SE NE 2-4n-10eCM, swabbed 84 bbl. of 37°-gravity oil per day from perforations in the Morrow sand at 4,411-56 ft. The Morrow was topped at 4,260 ft. with 5½-in. casing set at 4,787 ft. Acid treatment of the Morrow was not effective, and it is reported the operator will attempt to fracture the formation.

The apparent discovery would give Texas County its first oil production. The Hugoton gas field covers the major part of the county. This indicated Morrow oil strike lies 8 miles west of nearest Hugoton production.

Another Southwest Navina Pool Well on Production

Establishing a record of five consecutive producers out of five trys in Logan County's new Southwest Navina pool, Macmillan Petroleum Corp. et al have placed 2 Berg on

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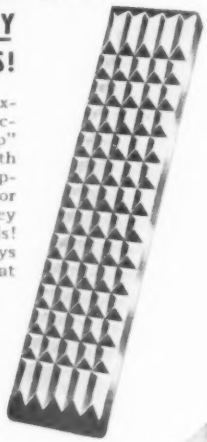

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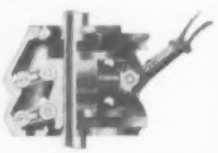

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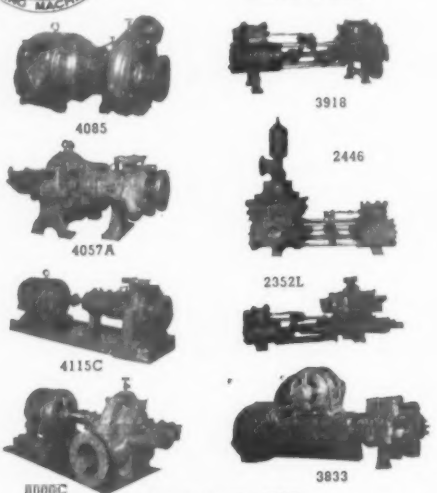

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production after a 12-hour test during which the well flowed at the rate of 500 bbl. per day or 21 bbl. an hour on 20/64-in. choke. Oil is 39° gravity.

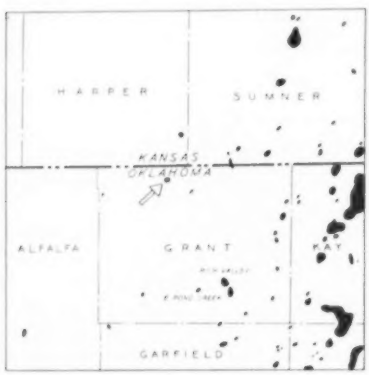
The well has been pinched back to the field allowance of 150 bbl. per day. Production is from 6,494-6,514 ft., or 20 ft. out of a total 85 ft. of second Wilcox oil sand.

The 2 Berg is located 1 location north of the field discovery well, the 1 Krout, which was placed on production last winter following an initial flow of 1,200 bbl. of 40°-gravity oil on a 20/64-in. choke per day. Production was from the second Wilcox at the same approximate depth as the 2 Berg. Other producers in the field are the 2 and 4 Krout, and the 1 Berg. Rotary tools have been moved to the 1 Scheihing, ¼ mile west of the 1 Krout, and this well will be spudded in immediately.

Simpson Production Opened In Northwestern Grant

Union Oil Co. of California, at its second wildcat in Oklahoma, has opened Simpson sand production in northwestern Grant County at 1 Simpson, NE NE SE 29-29n-6w, 13 miles northwest of Medford.

The Simpson sand was found at 5,255-63 ft. and a 2-hour drill-stem test was made at 5,255-68 ft. Gas showed in 3 minutes and oil flowed in 56 minutes. The well was turned to pits and made 42.1°-gravity oil at the rate



Arrow points to indicated Simpson sand discovery 13 miles northwest of Medford in northwestern Grant County.

of 35 bbl. per hour. Crews are running 5½-in. casing with total depth at 5,268 ft.

Nearest Oklahoma production is to the southeast at Grant's Southeast Prairie Home pool with Layton production at 4,000 ft. Nearest Kansas production is 20 miles northeast at Caldwell pool in Sumner County. This wildcat is located on the northeastern shelf of the Anadarko basin west of the Nemaha granite ridge. Successful completion of the indicated discovery would open first Simpson production in northwestern Grant County, a rank wildcat area.

A good well is reported in southern Grant County's East Pond Creek pool. Cummings-McIntyre et al have set 5½-in. casing at 5,947 ft. in 4 Combs, NW NE NE 6-25n-5w. A drill-stem test at 5,942-50 ft. flowed oil at the estimated rate of 50 to 100 bbl. per hour. East Pond Creek field was opened in 1951 at Cummings-McIntyre and Mid-Continent Petroleum Corp. 1 Combs, SE SE NE 6-25n-5w. Initial production was 374 bbl. of oil in 10 hours, flowing from the second Wilcox sand at 5,962-81 ft.

The new Union discovery is located northwest of South Prairie Home field, which is a Layton sand pool. Parker Drilling Co. 1

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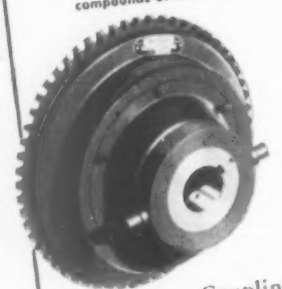

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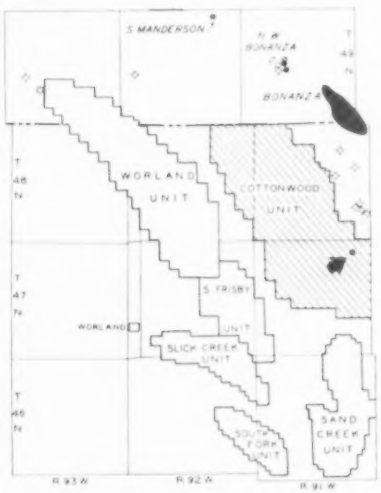
Mordy, NE NE SW 12-28n-6w, was completed in 1952 on the pump for 48 bbl. of oil per day. Grant County has two other Simpson sand pools, Southeast Rich Valley and Rich Valley. Rich Valley was opened in 1949 with initial production 1,200 bbl. of oil per day from the first Wilcox sand. Southeast Rich Valley field was opened in 1951 with initial production 412 bbl. of oil per day and 526 M.c.f. of gas from the second Wilcox sand.

ROCKY MOUNTAIN

WYOMING

Burke Ranch, Natrona County Discovery Completed

Houston Oil Co. has completed 2 Unit, NW NW NW 18-37n-78w in the Burke Ranch Unit, Natrona County for a flow of 65 bbl. of oil daily through ¾-in. choke. Total test was 8,367 ft. with the wildcat in Tensleep at this depth. The well was plugged back to 6,722 ft. for completion in Dakota. The well is on acreage farmed out by Carter Oil Co.



LATEST PHOSPHORIA DISCOVERY on the east side of the Big Horn basin is Stanolind Oil & Gas Co. 1 Cottonwood Creek unit, C SW SW 2-47n-91w, Washakie County, Wyoming. On initial production test this well pumped 184 bbl. of oil in 20 hours after reacidization through perforations at 7,270-94 ft. Cottonwood Creek unit lies south of Manderson and South Manderson fields where prolific wells have been completed in the Permian-Phosphoria.

Green River Basin Exploration on Increase

Additional exploration of Tertiary and Upper Cretaceous prospects in the Green River basin of southwestern Wyoming is in store, with locations announced through the area by two operators. Shell Oil Co. will drill the first test of the Pine Buttes Unit in Sweetwater County at 33-35 Unit, NE NW SE 35-15n-99w. The well will test Wasatch at about 5,500 ft. It is about midway between the Hiawatha and Baxter Basin gas fields, and north of the Shell Creek Unit where two Wasatch failures have been drilled within the past year.

In the Table Rock Unit, The Texas Co. has

made location in 2-18n-98w for an 8,000-ft. Mesaverde test. There has been no previous drilling to this formation within the unit. Mesaverde was not regarded as an important possible producing formation in the area prior to the discovery of oil at Middle Mountain and gas in the Trail Unit, both in Sweetwater County, during 1952.

MONTANA

Oil Recovered From Ordovician in Carter County

Test of Carter Oil Co.'s 1 Traweek, C NE NE 6-2n-61e, recovered oil and oil and gas-cut mud and water from the Red River member of the Ordovician. The well is in the Webster area, 9 miles south of production in Little Beaver field. Test was of the zone 9,057-75 ft. with tool open 4 hours, 20 minutes. Full recovery was 160 ft. of heavily oil and gas-cut mud, 630 ft. of slightly mud-cut black oil, 270 ft. of heavily oil and gas-cut salt water, and 3,960 ft. of oil and gas-cut salt water.

A later test from 9,056-65 ft. recovered 650 ft. of heavily oil and gas-cut salt water, 540 ft. of slightly oil and heavily gas-cut salt water, and 4,590 ft. of very slightly oil and gas-cut salt water. Tool was open 4 hours in this interval, but the operator reported packer failure, and will test the same zone. Total depth of the wildcat is 9,117 ft. with top of Red River at 9,017 ft.

The well is on a surface structure which is west of and parallel to the Cedar Creek anticline. One other well of significance has been drilled in the general area. It was a failure in NW SW SE 23-3n-61e, 2 miles north of the Carter Oil wildcat, and was completed in 1951 to a total depth of 9,850 ft. by Pure Oil Co. and Texas Pacific Coal & Oil Co.

New Montana Wildcat Locations Announced

Montana exploration proposed currently includes one well of importance within the Williston basin, and two tests west of the basin area of the state. George J. Greer, Trustee and Delhi Oil Corp. will drill 1 Danielson, C NE NW 5-27n-51e, Roosevelt County. The well is 2 miles northwest of the town of Poplar, and 4½ miles southwest of East Poplar field.

In the northwest Sumatra area of Rosebud County, R. L. Harris and associates will drill an Amsden test southwest of previous production from this formation in the area. This part of Montana has had considerably increased interest within the past 2 years as a result of Williston basin interest farther to the east. In the northern Powder River basin, Forest Oil Co. is preparing to spud a 5,500-ft. Shannon test at 1 Simpson, SW SW SE 20-9s-40e, Big Horn County. The well is 11 miles northwest of production in Ash Creek field of big Horn County and Sheridan County, Wyoming.

NORTH DAKOTA

Amerada Has Ordovician Show at Fryburg Discovery

Amerada Petroleum Corp. is drilling below 12,929 ft. at 1 May, C NW NE 9-139n-100w, in the Fryburg area of Billings County. In drill-stem test of the zone 12,354-12,446 ft. recovery consisted of gas-cut water with a scum of oil. Top of Red River was logged at 12,219 ft. The wildcat has had no shows of commercial significance since a flow of 20 bbl. of oil per hour was had from Madison at about 9,000 ft.

A ½-mile northwest stepout, 1 Logan, SE SW 4-139n-100w is drilling at 5,760 ft. This confirmation effort was started on the basis of the Madison tests.

COLORADO

Moffat County Morrison Discovery Nearing Final Tests

Anderson-Prichard Oil Corp. failed to find shows of significance in Entrada at Government 1-A, SE SE NE 17-4n-95w, Moffat County, and is preparing to run casing for completion in the Morrison sands. The wildcat is about 2 miles northwest of production in the Maudlin Gulch Unit. A recovery of 3,850 ft. of 50 per cent gas-cut oil was logged on test of the zone 6,002-34 ft. in lower Morrison. Morrison sands below this zone were largely water-bearing. Top of Entrada was logged at 6,285 ft. with some shows reported. Drill-stem tests were not run in Entrada, but the formation will be tested after casing is run. Total depth of the well is 6,330 ft. with casing landed at that depth.

Logan County Wildcat is "J" Sand Discovery

Lowell & Daniels recovered 4,000 ft. of free oil in pipe after 40-minute test of 1 Bonham C-12, SW NE SE 27-8n-55w, Logan County. Test was of the "J" sand interval

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5,386-5,406 ft., and oil flowed after 30 minutes. The well is west of Yenter pool, and northwest of the principal producing trend through northeastern Colorado. It is about 2 miles south of the Raymer Creek pool opener completed in July 1953 with production from the "D" sand. There were no shows in "D" sand at the Lowell & Daniels discovery.

Sedgwick County Gas Discovery Indicated

Stanolind Oil & Gas Co. tested 2,254,000 cu. ft. of gas per day at 1 Donaldson, C SE NE 26-10n-47w, Sedgwick County, for an indicated new pool opener. Test was run in "D" sand in the interval 3,829-70 ft. Pipe recovery was 1,020 ft. of water, and flowing pressure was 610-645 psi. The wildcat is one of a series being drilled by this operator through the county. Stanolind completed a gas discovery at 1 Franklin, C SE SE 35-12n-46w in 1952, but has delayed further work in the area until the present time.

KANSAS

New Kansas Pools Are Named by Committee

The Nomenclature Committee of the Mid-Continent Oil and Gas Association has given names to 22 new oil pools in 15 state counties. The new pools are located on the Central Kansas uplift and its flanks, the Hugoton embayment, and the Salina basin.

Central Kansas uplift and its flanks . . . J. A. Terteling & Sons 1 Cole, Barton County, opens Red Brick pool for 76 bbl. of oil daily from the Lansing. Rex & Morris 1 Marshall, NE SW SW 11-26s-7e, opens Long Northeast pool in Butler County for 25 bbl. of oil daily from the Mississippi lime.

C. K. Gillian 1 McEwen, SE NE SE 9-34s-8e, opens Cedarville pool in Cowley County, southern Kansas, for 15 bbl. of oil per day from the Mississippi. V. D. Sidey 1 Schmeidler, NE SE SE 29-12s-17w, is completing in the Arbuckle lime to open Schmeidler Northwest pool in Ellis County. Doley Oil Co. 1 Huber "B," SW SW NE 32-12s-20w, is also completing in the Arbuckle to open Ellis Northeast pool in Ellis, and Degenhart pool has been opened by Bay Petroleum Co. at 1 Degenhart, NW NW SW 15-15s-17w, with production 126 bbl. of oil per day from the Lansing.

Jones, Shelburne & Farmer 1 Mindrup in Norton County on the northern end of the uplift opens Norton East pool in the SW SW NW 31-3s-23w, for 260 bbl. of oil per day from the Arbuckle. Norton South pool was opened by Harry Gore Drilling Co. 1 Scott, NW NW NE 1-4s-24w, for 323 bbl. of oil per day from the Arbuckle. Empire Drilling Co. and Cranyln Oil Co. 1 Schugart, SW SE NW 23-5s-21w, is completing in the Arbuckle to open Ray Northwest pool, also in Norton County.

Morrison Drilling Co. 1 Harper, SE NE SE 4-20s-18w, completing from the Arbuckle, is the discovery well of Pawnee County's new Conklin pool. Helmerich & Payne 1 Hertlein, SE SE NW 22-28s-13w, opens Hertlein pool in Pratt County for 77 bbl. of oil daily from the Lansing. Isern Bros. 1 Zink, SE SE SE 34-18s-10w, finaled for 15 bbl. of oil per day from the Arbuckle, opens Munyon East pool in Rice County, while GMR Oil Co. opened Green pool at 1 Green, NW NE SE 14-19s-6w, in the Mississippi. Transit Corp. 1 Becker, SW SW SW 34-9s-16w, a recompletion for 22 bbl. of oil from the Toronto and Lansing, opens Kruse Northwest pool, Rooks County.

Heim pool was opened in Russell County by Shelley-Miller Drilling Co. 1 Heim, NE NE SE 21-14s-12w, which is completing in the conglomerate. Lee Phillips 1 Schumacher in Stafford County opens Prichard Southeast pool in NW NW NE 2-21s-14w, for 386 bbl. of oil per day from the Arbuckle. Elreco 1 Wendelburg, NE NE NE 29-25s-12w, completed for 186 bbl. of oil per day from the Viola, opens Taylorville pool in Stafford.

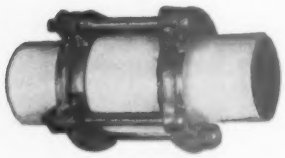
Pam-Kar 1 Hixson, NW NW NE 19-11s-22w, Trego County, opens Hixson pool. The discovery well was finaled for 15 bbl. of oil per day from the conglomerate. Lafayette Oil Co. 1 Baugher, SW SW SE 21-12s-21w, completed for 120 bbl. of oil per day, opens Adair pool in Trego County.

Hugoton Embayment . . . Finney County has a new oil pool, Finnup, opened by W. L. Hartman 1 Finnup, NE NE NW 34-22s-33w. The discovery was finaled for 434 bbl. of oil per day from the Mississippi. In Meade County Bruno Northeast pool was opened by Columbian Fuel Corp. at 1 Armentrout "A," C SW NE 16-33s-30w. The well was completed for 1,033 bbl. of oil per day from the Morrow sand.

Arbuckle Gas Pool Opening in Barton

Sunray Oil Corp. and Stickle Drilling Co. are opening a new Arbuckle gas pool in the southwest corner of Barton County.

Gas was gaged at the rate of 1,930 M.c.f. per day on a drill-stem test at 3,782-80 ft. at 1 Converse, NW NE SW 20-20s-15w. Recovery was 90 ft. of gas-cut mud. On a test



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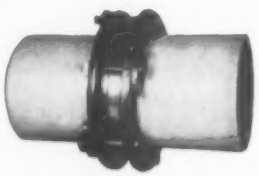

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at a lower interval, 3,791-3,836 ft., recovery was at the rate of 4,070 M.c.f. of gas per day and 66 ft. of gas-cut watery mud. The Arbuckle will be perforated for completion. The new pool is located 1½ miles east of Pawnee Rock production.

CALIFORNIA

Two Deeper Pool Strikes Recorded in San Joaquin

Two new deeper pool discoveries were recorded in San Joaquin Valley fields, one at Rio Bravo and the other at Cymric.

The former Union Oil Co. 62-34 Kern County was completed flowing 330 bbl. of oil daily, 34.5° gravity, through a 18/64-in. choke. Production was from about 11,606-698 ft. in the Hebling sand below the field's regular Vedder-Miocene pay. The test has been drilled to 13,499 ft. in search of deeper production.

Superior Oil Co. 1 Cymric unit was completed at 6,494-6,530 ft. to establish a new pay about 2,000 ft. below existing deepest production. Initial production was 131 bbl. of 27°-gravity crude oil daily, cut 4.5 per cent, through a 14/64-in. choke. It had been carried to 12,022 ft. before being plugged back to 6,550 ft. for completion.

Deep Ventura Test Abandoned

Humble Oil & Refining Co. abandoned 1 Linoneira in the Weldon Canyon area of Ventura County after reaching a depth of 15,474 ft. The wildcat, located in 23-3n-22w, was drilled by Standard Oil Co. of California to 10,727 ft. before being abandoned last January. Humble took over the test in April and deepened it.

Wheeler Ridge Outpost Completed

Richfield Oil Corp. completed 34-28 Gordon as a ¼-mile northeast extension to Wheeler Ridge-Eocene pool, Kern County, flowing at the rate of 1,152 bbl. daily. Production was through perforations at 10,069-10,323 ft. Following completion tests the extensioner was choked back to 336 bbl. daily through a 9/64-in. bean. Richfield also staked 45 K.C.L.-D as a southeast offset to the Gordon producer, in 28-11n-20w, and in SE NE Section 29 will drill 383 K.C.L.-D.

Elk Hills-Carneros Test Staked

Confirmation test for the Carneros sand discovery completed last year has been staked by Standard Oil Co. of California in the Elk Hills field, westside San Joaquin Valley. The company, which acts as operator of the Naval Oil Reserve, recently completed extensive tests of the 9,300-ft. discovery. These showed it had a stabilized output of about 175 bbl. of 52°-gravity condensate daily. The extension test will be 515-29R in NW SW 29-30s-23e, approximately ½ mile east of the discovery.

Northern County Tests

Signal Oil Co. was scheduled to start a 5,500-ft. test last week in Yolo County, about 7½ miles northeast of the Dunnigan Hills gas field. Drilled jointly with Monterey Oil Co., 1 Signal - Monterey - Reclamation was staked in SE NW 20-12n-1e.

Union Oil Co. was preparing location for 1 Waughaman in the Pescadero Creek area of Santa Clara County. Located in 27-11s-3e, the wildcat will be about 2 miles northwest of the abandoned Sargent oil field, one of the state's earliest oil fields.

Long Beach Airport Test

The Texas Co. shortly will start a deep test of the 1,040-acre airport tract it has leased from the city of Long Beach. The company was the successful bidder with an offer of $100 per acre bonus plus a royalty of 42.6 per cent. The wildcat, the first of two or three deep tests to be slant-drilled from locations adjacent to the airport, will by 1 Long Beach Airport.

New Huntington Beach Pool Added

A dry hole drilled 25 years ago southeast of Huntington Beach field, Orange County, has been successfully completed as a substantial producer in a new fault-block pool. Redrilled from 4,430 ft. to 5,460 ft., Wilson Oil Co. 1 Peterson flowed about 20 bbl. hourly through perforations at six intervals between 5,296 and 5,429 ft. The 28°-gravity crude was cut about 1 per cent with water. The well was drilled to 5,487 ft. in 1928 but was abandoned when it sanded up. Wilson has staked 7-3 Talbert as a southeast offset.

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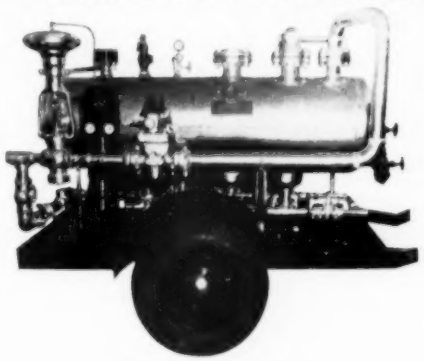

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INDIANA

New Trenton Gas Pool Has Six Producers

Waugh gas pool in Boone County, opened last winter at W. R. Moss 1 W. Merrill, 21-19n-2e, now has six producing wells.

The discovery well made 476 M.c.f. of gas per day from the Trenton lime at 1,057-61 ft. Wm. R. Moss, Sr., operator of the field, has 3,000 acres under lease. A total 2,600 acres in the area are proven. The operator has two wells in Section 15-19n-2e, 1 in Section 16, 2 in Section 41, and 1 in Section 22. Company engineers have estimated gas reserves in the field, which is west of the Trenton gas area of Indiana, and 20 miles northwest of Indianapolis, to be 1½ billion cubic feet. Each well has an initial production of 500 M.c.f. per day. The wells are shut-in pending outlet facilities.

ARKANSAS

Pettit Production at Springhill Extended

Mid-Continent Petroleum Corp. has extended Pettit production in Springhill field, southwestern Columbia County. The 1 Ensey, C NW SW 2-20s-23w, is pumping 216 bbl. of oil per day from perforations at 6,004-12, 6,026-32, and 6,057-63 ft. The well lies north of the other Pettit well in the field.

The Pettit discovery well, located in Webster Parish, Louisiana, was Stephens & Phillips 2 Mattie Grafton. The discovery was finaled early this summer, pumping 85 bbl. of oil per day from perforations at 5,910-15, 5,924-28, 5,934-50, 5,960-70, and 5,978-84 ft.

West Fork Field Test Staked in Washington

Arkansas Western Gas Co. will drill a 1,000-ft. wildcat in C 4-15n-30w, West Fork field, Washington County in northwestern Arkansas. The test is 2½ miles southeast of the field, and 1 mile east of the field's discovery well. The field has two gas wells producing from the Sylamore. The field was opened in January at Arkansas Western 1 Threldkeld, NE 5-14n-30w. Calculated open flow was 1,500 M.c.f. of gas per day from open hole at 566-586 ft.

NEW MEXICO

SOUTHEAST NEW MEXICO

Lea Wildcat is Devonian Prospect

Flowing oil on a drill-stem test in the Devonian was reported at Western Natural Gas Co. 1 Eidson, 35-16s-35e, 4 miles southeast of Townsend-Wolfcamp pool, and about 2½ miles southwest of Lawton Oil Corp. 1-L State, a Pennsylvanian Strawn discovery.

Top of the Devonian was 12,480 ft. on elevation of 3,977 ft. First test was made from 12,489-12,520 ft., using ⅝ and ½-in. top and bottom chokes. Fluid reached the top in 2 hours, which was cleaned into pits for 30 minutes. The well then made 66 bbl. of 61° oil in 3 hours, with no water. Operators cored additional porosity and oil shows in fractured dolomite to 12,560 ft. and prepared to test that section.

Pennsylvanian discovery . . . Stanolind Oil and Gas Co. 1 State AB, deep test in the shallow Empire-Artesia area, 29-17s-28e, has been completed as a rich gas-distillate discovery in a Pennsylvanian sand.

Hole was carried to 12,431 ft., which tested the Ellenburger, then plugged back to 10,270 ft. On open-flow test through perforations at 10,102-10,127 ft. the well made 30,000,000 cu. ft. of gas a day plus approximately 780 bbl. of 59° distillate. Top of the sand pay was 10,102 ft. on elevation of 2,717 ft. Nearest deep production is the Anderson Ranch field, 30 miles northeast.

Shell Oil Co. 1 Monteith, 14-16s-36e, 2 miles northeast of Lawton 1-L State, was ready for completion as a Permo-Pennsylvanian discovery. On production test the well flowed 56 bbl. of oil in 19 hours through 24/64-in. choke. Pay section was perforated from 10,500-10,525 ft.

MICHIGAN

The first Richfield oil well in the Franklin Township, south extension area of Headquarters pool, Clare County, appeared in prospect at the E. V. Hilliard 1 Stafford et al, N½ NW SE 10-20n-3w. This well, which not only showed for a probable good Richfield oil pay, was also considered to be a potential in the Detroit River "sour" zone section, which was also perforated for possible dual completion in the two oil producing horizons.

Well was bottomed out in the Richfield at 5,317 ft. Long string of 5-in. casing was set

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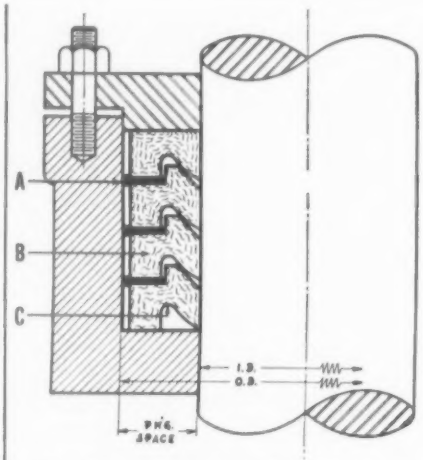

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at 5,274 ft. The Richfield zone was perforated with 4 shots per foot at 5,038-40; 5,060-65; 5,175-80; 5,217-18, and at 5,221-23 ft. The Detroit River pay section was likewise perforated with 4 shots per foot at 4,904-08; 4,929-31, and at 4,991-95 ft. In 11 hours after perforating was completed well carried 2,000 ft. of fluid, with only a show of water in evidence. It was believed that most of the showing on this test was from lower perforations. After well has been swabbed down, the Richfield pays will be acidized with 4,000 gal. All of the other producers in this area of the pool are being produced from the Detroit River pay zone.

The Lawton Traverse oil pool, Porter Township, Van Buren County, continued to be the "hottest" development area in southwestern Michigan and one of the best developing prospects in the state. Recently two new wells were added in the pool, while others were either being completed or were within a week of being completed.

New completions were added at Ford Oil Co. 1 Exceen Comm., NW SW SE 5-4s-13w, good for 100 bbl. of oil a day pumping after acid treatment at 1,150 ft., total depth, with 650 gal., and at the Norman L. Stevens 1 Grunwaldt, NE SW NW 8-4s-13w, good for 40 to 45 bbl. of oil a day following acid treatment with 3,000 gal. at 1,213 ft., total depth.

TEXAS

NORTH CENTRAL TEXAS

Discovery Gaged; Deep Wildcat Scheduled

In Montague County Osage Exploration Co. 1 T. R. Copeland, 2 miles southeast of Belcherville, had flowing production from the Bend conglomerate. Preliminary testing through perforations at 6,110-19 ft. and 6,134-42 ft. developed a flow of 70 bbl. of oil in 6 hours. First test at 5,960-67 ft. recovered 2,700 ft. of oil and 1,800 ft. of salt water. Testing continued. Location is 1 mile west of Lone Prairie field.

In Coleman County operators reported completion of a small flowing Gray sand discovery, and the filing of application to drill an 8,000-ft. wildcat.

The new exploration, if carried to proposed depth, will be the deepest ever drilled in Coleman County. The test is to be H. M. Naylor Oil Co., Houston, 1 Stone, located in Section 73, Childress Survey, 3 miles northeast of the town of Talpa. Plans call for complete penetration of the Cambrian section, which some geologists believe will be accomplished in less than 8,000 ft.

The new discovery is Coronet Oil Co. 1-83 Beach, 13 miles north of Coleman, which completed for 24 bbl. of oil daily through 16/64-in. choke from perforations at 3,023-38 ft. Nearest production in the Mary Opal field is from Morris sand.

WEST TEXAS

Graf Strawn Pool Confirmed by Offset

A second Pennsylvanian well in the new Graf pool east of Wilshire in western Upton County was in the making at Gulf Oil Corp. 3-PL McElroy Ranch, in the southeast corner of Section 109, west offset to the discovery.

Top on the Strawn in the new well was not reported, but a core between 9,796-9,801 ft. recovered 29 ft. of limestone having good porosity and oil stains. First test of the interval, from 9,773-96 ft. developed considerable gas and recovered oil and gas-cut mud. Second drill-stem test from 9,772-9,825 ft. had gas in 5 minutes, estimated up to 2,500,000 cu. ft. daily, and flowed oil in 1 hour and 13 minutes. After cleaning into pits, the flow was gaged at 33 bbl. of 52° oil in 4 hours. Operators were running electrical surveys and planned to complete from present total depth of 9,825 ft.

The Texas Co. 1 Graf, discovery well, completed from perforations at 9,828-43 ft. after finding the Ellenburger dry.

Development Started Around Howard County Discovery

Oceanic Oil Co. et al have staked location for a north offset to their 1 Winans, recent Pennsylvanian reef discovery, and have announced intentions to drill a direct south offset. The latter will be a joint operation with Phillips Petroleum Co., with Oceanic as operator.

The 2 Lou Winans in 25-33-T3N-T&P is the north offset. The south well will be in the NW NW of Section 25.

Oceanic's reef strike has brought up the possibilities of townlot drilling, generally expected from the Texas Railroad Commission's Rule 37, and the first test scheduled within the Vealmoor townsite is Cobb & Daniel 1 Veal Memorial Fund. Location is approximately ½ mile northeast of the discovery. Operators were moving in rotary at last report.

TEXAS GULF COAST

Madisonville Area Gets Woodbine Gas Producer

Group Oil Co., Houston, has completed a Woodbine-Dexter gas well in the Madisonville area of Madison County. The well, 1 Johnson, in the Amy Boatright Survey, flowed 15,200,000 cu. ft. of gas per day with a spray of 52.3°-gravity condensate. Pressure, with the well shut in, gaged 3,267 psi. Production is from a series of perforated intervals from 9,114 ft. to 9,195 ft. Total depth is 9,850 ft. Location is 2,900 ft. northwest of the discovery well completed in the shallower sub-Clarksville zone at 8,522-25 ft.

DeWitt County Wildcat Makes Wilcox Gas Well

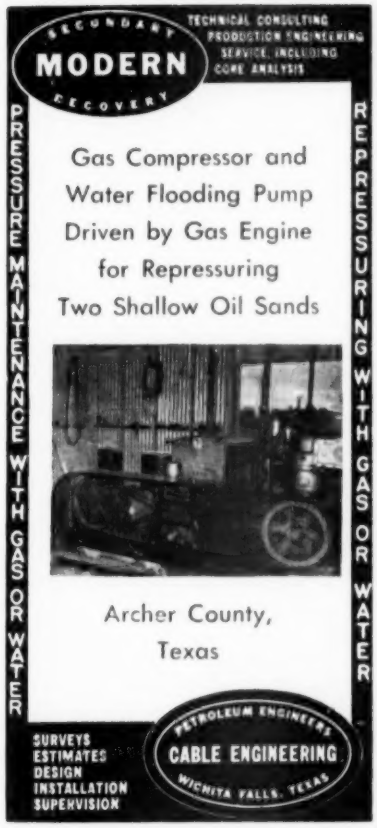
A new Wilcox gas-producing area has been opened in southeastern DeWitt County with the completion by Robert Mosbacher of his 1 Zingerle flowing at the rate of 12,750,000 cu. ft. of gas per day on open flow tests. Pay is open through casing perforations at 7,780-83 ft. and 7,798-7,816 ft. The well had been drilled to 7,853 ft. and has casing cemented at 7,853 ft. Location is in the Thomaston area, adjacent to Victoria County.

SOUTHWEST TEXAS

Oil Showings Indicate New Hidalgo Discovery

Indications of a new oil and gas field, located northwest of McAllen, in Hidalgo County, have been given by showings encountered by Sunray Oil Corp. at its 1 Beaurline, a wildcat in the Santa Anita Survey. The indicated discovery is 2½ miles from nearest production, the Los Indios field.

Showings have been encountered in two different sands, both in the Frio section. In a drill-stem test of the shallower sand at 5,656-66 ft., 75 ft. of oil and gas-cut mud in



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emulsion was recovered. In the deeper sand, a 15-minute test at 5,757-94 ft. flowed gas with 880 psi. surface pressure and recovered distillate-cut mud.

CANADA

Gas Discovery Reported In Central Alberta

This weekend brought news of another wet gas discovery on the central Alberta plains, and word that a wildcat in the southeast sector of Saskatchewan had found an encouraging showing of crude oil. Meanwhile, the other Alberta wet gas strike for the week, has fully penetrated the basal quartz, and has an indicated approximate 45 ft. of wet gas zone.

The new wet gasser is being drilled by the Seaboard-Honolulu-Merrill-Cancoll team, and is located 25 miles west of Lacombe, 29 miles northwest of Red Deer and about 13½ miles southwest of D3 oil production at Rimbey.

The well is Seaboard 10-4 Sylvan Lake, LSD 10, 4-41-3w5. Crew entered the basal quartz at 6,936 ft., or 3,789 ft. subsea (K.B. elevation 3,147 ft.), and drill-stem tested from 6,943 to 6,981 ft. for 25 minutes. Natural gas flowed in 5 minutes, at estimated rate of over 2,000,000 cu. ft. daily, and distillate sprayed to the surface in 10 minutes. Recovery was 130 ft. of gas and distillate-cut mud. Hydrostatic pressure was 3,600 psi.; flowing pressure, 992 psi.; and shut in pressure, 2,232 psi.

Two other drill-stem tests were run, but there was no gas or distillate production from those tests. Interval 6,984-91 ft. gave a weak air blow and recovery of 50 ft. and in 43 minutes; interval 6,986-7,006 ft. gave a faint air blow—packer was reset and recovery was 50 ft. mud. Crew is now ratholing below 7,006 ft.

Minard area . . . The Saskatchewan showing came at Shell Oil Co.'s A-1-4 Minard wildcat, LSD 1, 4-5-7w2, in the Minard area, 15 miles northeast of Estevan, and 21 miles southeast of Shell's Midale oil discovery well.

Although not officially released from Shell as yet, it is reliably reported that drill-stem tests in the Charles member of the Mississippian has given up oil encouragement. The unofficial reports gave the following test results: Interval 4,755-72 ft., recovered 180 ft. of oil-flecked mud and 1 ft. of oil in 45 minutes; interval 4,808 to 4,830 ft., recovered 300 ft. of oil and water-cut mud in 30 minutes (reportedly 80 per cent oil). There were two misruns between the above drill-stem tests—but no production was evident. Crew is currently drilling in the Mission Canyon formation.

EASTERN CANADA

Ontario . . . In Warwick Township, Lambton County, Imperial Oil 2 on the Hollingsworth farm near Watford has struck a flow of gas and oil in the Guelph-Niagara formation around 2,300 ft. and is testing. A previous well which encountered gas and traces of oil in the same horizon ran into a fishing job, and has been capped. Five other drilling outfits are working in the same general area, east and north of the old Dawn field.

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MISSISSIPPI

Production Tests Prove Knox Dolomite Discovery

Preliminary flow tests at Magnolia Petroleum Co.'s previously indicated Knox dolomite oil-discovery well in western Monroe County, in the northeastern Mississippi portion of the Black Warrior basin, have substantiated the earlier assurances of production.

The well, 1-A Snow, located in the C NW NE 27-13s-7e, 7½ miles north and a little west of Aberdeen, flowed initially, following a 3,000-gal. acid treatment, at the rate of 29.3 bbl. of oil per hour through 17/32-in. choke. Later, with flow restricted to a 12/64-in. choke, it produced at the rate of 216 bbl. of oil per day. Tubing pressure gaged 300 psi. Gravity of the oil is 35°. At latest report the well was shut in for additional tankage.

Production is from a casing-perforated interval at 4,753-56 ft. Top of the porosity zone had been logged by samples at 4,751 ft. Hole was carried to 4,769 ft. and has 7-in. casing to bottom.

(For additional information on the discovery see The Oil and Gas Journal, August 31, 1953, issue, page 166.)

KENTUCKY

EASTERN KENTUCKY

In Big Sandy gas field and located on Long Fork in the Pike County sector, Kentucky West Virginia Gas Co. has completed another good shallow gasser. Their 6134 Silas Johnson had top of Pennsylvanian salt sand at 1,597 ft. and upon drilling to a total

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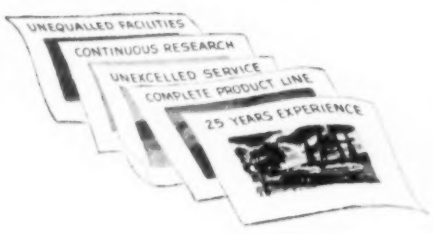

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depth of 1,689 ft. had a natural open flow potential of 1,565,000 cu. ft. of gas daily.

In the same field and county but located on Blaze Branch, Kentucky West Virginia Gas Co. have completed an oil well at 1000 B. H. Potter. Topping Salt sand at 1,355 ft. operators had oil pay from 1,416 to 1,422 ft. good for 15 bbl. daily. Total depth of hole is 1,425 ft.

LOUISIANA

SOUTH LOUISIANA

New Oil Field Opened In Beauregard Parish

Sunray Oil Corp. and Texas Pacific Coal & Oil Co. have opened a new, deep oil field on their jointly owned 7,600-acre block in the Bayou Serpent area, 5 miles southeast of Tulla, in northeastern Beauregard Parish.

The discovery well, 2 Long Bell, in 10-4s-8w, flowed at the rate of 427 bbl. of 44.5-gravity oil with 1,900,000 cu. ft. of gas per day on initial tests through chokes.

Producing sand is open through casing perforations at 12,668-96 ft. in hole drilled to 12,881 ft. Gas showings were encountered in at least two other sand zones, which as yet have not been tested.

No water was indicated in initial tests. Flowing pressure gaged 2,450 psi.

Oil Production Opened in New Pay at Shell Point

First oil production and a new pay zone have been opened in the Shell Point area of Orleans Parish, where The Texas Co. has completed its 3 State Lease 1897 flowing at the rate of 177 bbl. of 35.5-gravity oil with 116,000 cu. ft. of gas per day through ¼-in. choke from a sand interval at 9,103-40 ft.

Location of the discovery is ¼ mile east of the company's initial well, 1 State, completed in July 1951 as a gas producer from a sand interval at 7,197-7,221 ft. The only other test in the area has been the company's 2 State, abandoned last February as dry after drilling to 10,290 ft.

All three wells have been located offshore in Lake Borgne. The discovery well was drilled to 13,270 ft. before completing in the 7,200-ft. sand. The latest well is bottomed at 9,887 ft.

APPALACHIAN AREA

OHIO

A wildcat completed by I. C. Beck Co. on I. C. Reynolds within the corporation of Mentor Village in Lake County, responded very well to sand fracturing. Clinton sand was found at 2,945-97 ft. with an open flow of 350,000 cu. ft. natural and 3,120,000 cu. ft. with a rock of 1,140 psi. after treatment.

A second large well was completed in Rine pool in Pike Township, Coshocton County. National Gas Co. 8 D. G. Rine, Section 4, with 800 ft. of oil in 12 hours natural, increased to 577 bbl. in 24 hours after fracturing. In New Castle Township, John Morrow 4 Heffelfinger, Lot 12, first quarter, made 56 bbl. daily after treatment.

Preston Oil Co. 2 H. W. Scott, Section 24, Jackson Township, Knox County, made 320 bbl. in 24 hours after fracturing sand logged at 2,902-59 ft.

WEST VIRGINIA

Middle Fork district, Randolph County, West Virginia, Washington Natural Gas Co., located 1 J. E. Hanifal et al, wildcat, elevation 2,904 ft., Sago Quadrangle, 1.75 miles south of latitude 38 degrees 50 minutes and .30 mile west of longitude 80 degrees .05 minutes. Nollem Oil & Gas Corp., completed 2 Moore Keppel & Co., wildcat, elevation 2,638 ft., gaged 800,000 cu. ft., gas after Sandfrac treatment and after being shut in for one week had a rock pressure of 620 psi. The Fifth sand was at 1,930-1,964 ft., gas 1,951-1,964 ft., TD 1,966 ft.

In Buffalo Township, Washington County, Southwest Pennsylvania, Washington Oil Co., 1 Kelly-Southerland deep wildcat encountered 2,000,000 cu. ft. of gas and some water in the top of the Big Drunkard sand at 1,012 ft. This is being cemented off in order to continue drilling.

WILDCAT COMPLETIONS

SOUTHWEST TEXAS

Aransas County: C. G. Glasscock and Union Producing Co. 1 State, Tract 1, Copano Bay (North Fulton Beach area). Dry, TD 7,527 ft.

Renwar Oil Corp. 1 United, Isaah Gilliland Sur., A-71. Dry, TD 9,020 ft.

Atascosa County: Harry S. Stahl 3 Cousin et al, Peter McGreal Sur. 1297, A-624. Dry, TD 536 ft.

Harry S. Stahl 5 Cousins et al, F. M. Mansfield Sur. 6. Dry, TD 1,964 ft.

Cameron Parish: Union Oil Co. of California 2 Mellie Esperson, Block 26, San Martin Grant, Share 3. Dry, 9,875 ft.

Dimmit County: Grace Oil Co. and H. G. Tigner 1 Anderson et al, Block 1, H & GN Sur. 6, A-1047. Dry, TD 5,006 ft.

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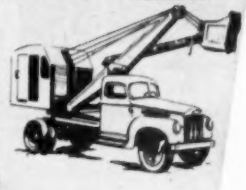

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WILDCAT COMPLETIONS

Howeth & Mason 6 Light, Block A, I & GN Sur. 63, A-525. Dry. TD 5,555 ft.

Duval County: Robert H. Blair and John B. Vreeland 1 Lloyd, BS & F Sur. 67, S-90. Dry. TD 3,208 ft.

Bridwell Oil Co. 3 Garcia, Jose Marcelo Ynojosa Grant, Block 12, A-628. Dry. TD 6,312 ft.

Bridwell Oil Co. 2 Marshall State, George Lichtenberger Sur. 220, A-1860. Dry. TD 2,510 ft.

Appell Drilling Co. 1 Wilburt Bub, Lot 3, Block 8, Copita Farm & Garden Tract. Dry. TD 4,316 ft.

Gonzales County: B. Coleman Renick and W. F. Surron 1 Robinson, James Tumlinson Sur., A-74. Dry. TD 2,309 ft.

Guadalupe County: Patterson Drilling Co. and E. A. Rogers, Jr., et al 1 Beuthagel, Peter Bollinger ½ Lge., A-54. Dry. TD 1,990 ft.

Hays County: Armon E. Mabry 2 Ruby, Charles Henderson Sur. Dry. TD 1,051 ft.

Jim Hogg County: Big "6" Drilling Co. 1 Mestina, Jose Marcello Ynojosa Grant. Dry. TD 5,135 ft.

Plymouth Oil Co. 1 McCampbell et al, Las Vivoritas Grant. Dry. TD 6,566 ft.

McMullen County: W. P. Howard 1 Hehler est., George Pittuck Sur., A-10. (Calliham area). Dry. TD 981 ft.

Medina County: R. S. Hays and Charles A. Daubert 1 Carter, T. R. Littleton Sur. 152. Junked hole. TD 1,202 ft.

Nueces County: F. B. Cochran, Jr., 1 Cox & Cryer, J. Gallagher Sur. 166, A-1009. Dry. TD 3,904 ft.

San Patricio County: Kirkwood & Co. and W. Carlton Weaver 1 Ondrusek, Lot 2, Block 8, first subdivision of Taft Farm Lands. Dry. TD 6,526 ft.

Kirkwood & Morgan, Inc., 1 C. A. Maedgen, J. M. P. & N. Delgado Grant. Dry. TD 4,975 ft.

Starr County: C. G. Glasscock 1 Amelia R. Canales, Tract 8, Share 2, El Javali Grant. IPP 46 BOPD, 28.6°, Brennan sand 1,881-89 ft. (casing perforations). TD 2,100 ft. (New field-Marks area.)

John J. Pichinson and Thelma D. Parr 1 Davis, Lot 5, Share 78, Porcion 81. IPP 30.36 BOPD, 21°, open hole 1,452-57 ft. TD 1,457 ft. (New feild-Theljon.)

Webb County: Killam & Hurd 1 Lopez, Sur. 724. Dry. TD 2,514 ft.

The Texas Co. 15 Kirkpatrick NCT-1, W. W. Griffin Sur. A-2261 and CCSD & RGNG Sur. 58. IPP 10.33 BOPD, 45°, casing perforations 1,854-68 ft. TD 2,287 ft. (New field—Kirkpartick.)

Wymore Oil Co. 1 Idolina Garcia de Avila, Sur. 707. Dry. TD 3,709 ft.

TEXAS GULF COAST

Bee County: Fidelity Oil & Royalty Co. 1 Walton, Block 8, O. H. Delano Sur., A-153. Dry. TD 5,063 ft.

DeWitt County: Kirkwood & Co. and W. Carlton Weaver 1-A Boothe, David Balfour Sur., A-74. Dry. TD 8,150 ft.

Magnolia Petroleum Co. 1 Hahn, N. Sayers Sur., A-451. Dry. TD 10330 ft.

Robert Moshacher 1 Zengerie Charles Lockhart Sur. IP 12,750 M.c.f. daily, open flow, Wilcox 7,780-83 ft. (casing perforations). TD 7,853 ft. (Extends Thomaston area.)

Fort Bend County: Wheelock-Weinschel 1 Lockwood & Sharp, William McMahon Sur., A-285. Dry. TD 8,514 ft.

Goliad County: Carnes W. Weaver 1 Ideus, G. Casius Sur., A-94. Dry. TD 7,880 ft.

Jackson County: J. P. Petkas 1 Weeks, Thomas Menefee Sur., A-52. Dry. TD 6,815 ft.

Live Oak County: Kirkwood & Morgan, Inc., 1 Boothe, M. B. Kivlin Sur. Dry. TD 5,384 ft.

V. G. Schimmel et al 4 Lennox, G. I. Hass Sur. 59. Dry. TD 3,626 ft.

Montgomery County: H. L. Hunt 1 Carter et al, William S. Taylor Sur., A-545. Dry. TD 7,895 ft.

C. N. Housh 1 Foster, M. B. Lawrence Sur., A-310. Dry. TD 6,016 ft.

Newton County: Texas Gulf Producing Co. and Rowan Oil Co. 1 Hankamer et al, Ennis Hardin Sur., A-141. Dry. TD 7,237 ft.

EAST TEXAS

Harrison County: LaGloria Corp. 1 C. C. Richardson Unit, David Earl Sur. Dry. TD 6,755 ft.

Morris County: W. M. Coats and R. F. Moore 1 Reese, TCRR Sur. 728, A-369. Dry. TD 4,944 ft.

Navarro County: Hoxsie and Dobson 1 Dovie Cook, Mary Smith Sur., A-724. Dry. TD 3,345 ft.

Panola County: Placid Oil Co. 1 J. M. Furrh estate, Daniel Tuttle Sur. A-668. Dry. TD 6,657 ft.

San Augustine County: Standard Oil & Gas Co. 1-A Fox, William White Sur. Dry. TD 9,002 ft.

Upshur County: Spartan Drilling Co. 1 J. V. Cook, Lemuel Brown Sur., A-23. Dry. TD 8,319 ft., elev. 330 ft., Woodbine 4,020 ft., Main Street 4,510 ft.

WEST CENTRAL TEXAS

Brown County: R. L. and A. D. Carson 1 Jennie Stone Thomas, R. Mitchell Sur. 141. Dry. TD 1,233 ft.

Trans-Tex Exploration Co. 2 Jones, Wm.

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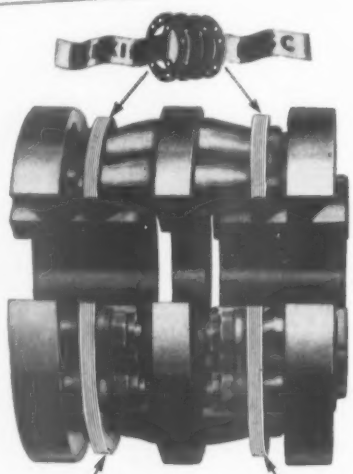

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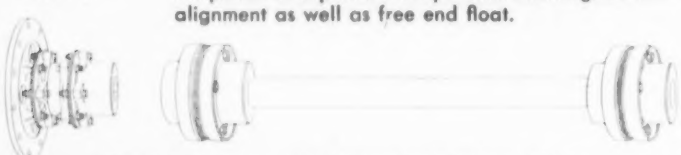

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WILDCAT COMPLETIONS

English Sur. IPP 40 BOPD, 43°, pay 1,135 ft., TD 1,192 ft.

Callahan County: Burt Oil Co. 1 E. A. Hodges, Sec. 362, G. W. Denton Sur. Dry. TD 1,780 ft.

Johnson & Warren 1 Fred Heyser, A. W. Smith Sur. 219. IP 57 BOPD, ¼-in., pay 1,819 ft. TD 1,820 ft.

Miami Operating Co., Inc., 1 Findley, Sec. 73, BOH Sur. Dry. TD 4,145 ft.

Sanders Oil Co. 1 Kennard Estate, 94-13-T&P. Dry. TD 4,017 ft.

Coleman County: R. W. Bradley 1 Maude Burroughs, Sec. 27, HT&B. Dry. TD 2,150 ft.

Plymouth Oil Co. 1 DePrang, 26-1-BS&F. Dry. TD 3,988 ft.

Yeatman Drilling Co. 1 E. C. Coursey, W. W. Walingford Sur. 692. Dry. TD 3,360 ft.

Eastland County: Missouri Valley Dredging Co. 1 Effie Lewis, 15-2-ETRR. Dry. TD 1,600 ft.

Fisher County: S. C. Herring Drilling Co. 1 Tom Parker, 200-3-H&TC. Dry. TD 6,600 ft., elev. 2,039 ft., Mississippian 6,514 ft., Ellenburger 6,592 ft.

Haskell County: Deep Rock Oil Corp. 1-A Sarah E. McGee, 37-A405-Wise CSL. Dry. TD 6,210 ft.

Nolan County: American Trading & Production Co. 2 Jessie Little, 25-20-T&P. Dual completion, new pay in lower horizon and extension to White Flat field. IP 240 BOPD, 46°, 24/64-in., Strawn perforations 5,125-43 ft.; IP 1,869.6 BOPD, 32/64-in., Wilberns perforations 5,506-30 ft. TD 5,858 ft.

Palo Pinto County: Pete Hall Drilling Co. 1 Ross Watson, 37-2-T&P. Dry. TD 2,006 ft.

Parker County: Rowan Oil Co. and Texas Gulf Production Co. 2 Carter, Desiderio De La Cruz Sur., A-223. Dry. TD 1,669 ft.

Shackelford County: Mid-States Pipe & Supply Co. 1-C Macon, Sec. 69 and 70, LAL Sur. IP 86.5 BOPD, ½-in., pay 3,885 ft. TD 3,891 ft.

Perini & Sandefer 3 Hendrick Ranch, Sec. 157, ETRR Sur. IPP 27.2 BOPD, pay 1,444 ft., TD 1,146 ft.

West Central Drilling Co. 1 T. G. Hendrick Estate, Jesse Pate Sur. 1. Dry. TD 1,355 ft.

Throckmorton County: Cosden Petroleum Corp. 2 Hunt Ranch, Colorado CSL. Dry. TD 5,569 ft., Mississippian 5,498 ft.

Howsley & Jacobs 1 Annette E. Davis, Sec. 193, BBB&C. Dry. TD 5,075 ft.

G. E. Kadane & Sons 1 Hendrick Estate, on Section line between Sec. 15 and 17. Dry. TD 5,510 ft.

Russell Maguire 1 Swenson, Sec. 169, BBB&C. Dry. TD 5,231 ft.

NORTH TEXAS

Archer County: E. B. Clark 1 Laura P. Jones, M. Galan Sur. Dry. TD 4,014 ft.

Darden-Hannis et al 1 Falls CSL, Blk. 63, Falls CSL, A-130. Dry. TD 1,206 ft.

G. E. Kadane & Sons 1 Wilson, E. Hall Sur., A-682. Dry. TD 5,068 ft.

Taubert & Harper 1 Jones & Cullum, Blk. 18, ATNCL Sur. Dry. TD 1,900 ft.

Baylor County: Felco Oil Co. 1-C Cowan, Blk. 102, T&NO. Dry. TD 2,712 ft.

Felco 1-D Cowan, Blk. 97, T&NO. Dry. TD 3,161 ft.

Clay County: Jack Grace Production Co. 1 Joe Threadgill, Blk. 7, Jack CSL, A-265. Dry. TD 7,275 ft., Caddo 6,109 ft., Barnett shale 6,782 ft.

Wm. H. Spradling 1-A Boddy, Blk. 46, W. Richardson Sur. IPP 35 BOPD, 39°, pay 1,046 ft. TD 1,047 ft.

Wichita River Oil Corp. 1 Georgiana Franke, C. Thompson Sur., A-444. IPP 10.5 BOPD, 38°, pay 3,403 ft. TD 3,464 ft.

Cooke County: H. E. Gibson 1 E. S. Thrasher, Blk. 7, Fannin CSL. Dry. TD 5,790 ft., elev. 834 ft., Oil Creek 5,544 ft., Ellenburger 5,744 ft.

Grayson County: Jess P. Cross 1 Christman, M. L. Ahalt Sur. Dry. TD 875 ft.

Craig, Jackson & Meyers 1 Dement Lease, TE&L Sur. 2757. Dry. TD 360 ft.

Tom B. Medders 2 Mary Hoefle, O. H. P. Davis Sur. Dry. TD 579 ft.

Montague County: T. V. Gorman 1 A. B. Hinton, Alexander Coats Sur., A-129. Dry. TD 2,403 ft.

Wilbarger County: Dublin Kiel 1-H Waggoner, 6-17-H&TC. Dry. TD 2,003 ft.

Young County: L. T. Burns 1 B. W. King, TE¾L Sur. 626, A-784. Dry. TD 4,414 ft.

Childress Drilling Co. 1 Vance, Blk. 2716, TE&L. Dry. TD 2,722 ft.

James W. Harvey 1-A Bailey, TE&L Sur. 60. Dry. TD 905 ft.

WEST TEXAS

Andrews County: Stanolind Oil & Gas Co. 1 Midland Farms AE, 45-41-T2N-G&M-MB&A. IPP 158 BOPD, 23°, pay 4,795-4,830 ft. TD 12,955 ft., PB 4,943 ft. Elev. 3,658 ft., Devonian 11,160 ft., Ellenburger 12,860 ft.

Cochran County: DeKalb Agricultural Association 1 Wright, 20-115-Potter CSL. Dry. TD 4,921 ft.

Coke County: Seaboard Oil Co. 1 A. N. Counts, 32-Z-D&SE. Dry. TD 7,506 ft., Strawn sand 6,831 ft., Ellenburger 7,420 ft., elev. 2,520 ft.

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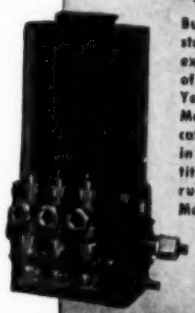

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WILDCAT COMPLETIONS

Crockett County: Sun Oil Co. 1 Myrtle Mitchell, 111-1-I&GN. IP 4,300 M.f.g., Ellenburger 13,808 ft. TD 14,558 ft.

Crosby County: Humble Oil & Refining Co. 1 R. N. Irvin, 889-C3-EL&RR. Dry. TD 9,947 ft., elev. 3,165 ft., Mississippian 9,420 ft., Ellenburger 9,848 ft., pre-Cambrian 9,922 ft.

Carl Westlund and E. R. Stewart 1 Wahlemmaier, Blk. 4, E. J. Moore Sur. Dry. TD 3,011 ft.

Ector County: Mohawk Petroleum Corp. 1 H. S. Foster, 32-42-T3S-T&P. Dry. TD 4,956 ft.

Garza County: Duncan Drilling Co. 1 Robertson, 1-24-HE&WT. Dry. TD 3,816 ft.

Kent County: Stanolind Oil & Gas Co. 1-A Girard Trust, 68-1-H&GN. Dry. TD 7,277 ft., elev. 2,174 ft., Pennsylvanian 6,437 ft.

King County: Sid Katz 1 J. C. Carothers, 165-5-H&TC. Dry. TD 6,435 ft., elev. 1,849 ft., reef 4,687 ft., Strawn 5,535 ft.

Loving County: Hanlon-Boyle, Inc., 1-D Mrs. Sid Kyle, 34-55-T1-T&P. Dry. TD 4,009 ft., elev. 3,098 ft., Delaware limestone 3,991 ft., sand 4,030 ft.

Schleicher County: General American Oil Co. 1 R. M. Thompson, 70-A-HE&WT. Dry. TD 7,439 ft.

C. L. Norsworthy, Jr., 1 J. Rogers, 10-8-TW&NG. Dry. TD 5,580 ft., elev. 2,292 ft., Strawn 4,485 ft., Ellenburger 4,938 ft.

Sutton County: C. L. Norsworthy, Jr., 1 Halbert, 49-9-TWNG. Dry. TD 6,902 ft., elev. 2,378 ft., Strawn 5,972 ft., Ellenburger 6,692 ft.

Upton County: Buffalo Oil Co. 1 Sanger Investment Co., 24-35-H&TC. Dry. TD 5,462 ft., elev. 2,462 ft., Devonian 5,350 ft.

Vickers Exploration, Ltd., 1 University, 13-5-University Lands. Dry. TD 11,801 ft., elev. 2,769 ft., Strawn 9,085 ft., Devonian 10,250 ft., Ellenburger 11,530 ft.

Ward County: Continental Oil Co. 1 Cynthia Monroe, 35-33-H&TC. IP 1,800 M.f.g., open tubing, pay 4,835 ft., elev. 2,561 ft., Delaware lime 4,818 ft.

Continental 1 L. M. Watson, 32-33-H&TC. IP 46 BOPD, ½-in., 38°, Delaware 4,845 ft., elev. 2,550 ft., Wolfcamp 10,346 ft. TD 14,878 ft.

SOUTHEAST NEW MEXICO

Chaves County: Forest Oil Corp. 1 General American-Federal, 7-7s-31e. IP 1,023 BOPD, ½-in., 42°, elev. 4,314 ft., Pennsylvanian pay 7,774 ft. TD 9,298 ft.

Eddy County: Stanolind Oil & Gas Co. 1 Guadalupe Foothills Unit, 20-22s-25e. Dry. TD 13,034 ft., elev. 3,961 ft. estimated. Bone Springs 4,445 ft., Wolfcamp 7,935 ft., Pennsylvanian 8,700 ft., Mississippian 10,890 ft., Devonian 11,325 ft., Simpson 12,410 ft., Ellenburger 12,568 ft.

Lea County: Holder & Ross 1 State, 3-14s-32e. Dry. TD 154 ft.

Texas Pacific Coal & Oil Co. 1 Lane-Mill Unit, 32-15s-32e. Dry. TD 13,655 ft., elev. 4,335 ft., Mississippian 12,895 ft., Devonian 13,584 ft.

Texas Pacific 1 SE Caprock Unit 5, 27-13s-32e. Dry. TD 12,460 ft., elev. 4,340 ft., Pennsylvanian 8,687 ft., Mississippian 11,578 ft., Devonian 12,230 ft.

ILLINOIS

Bond County: Dale Hopkins 1 Welch, NW SE SE 33-4n-2w. Dry. TD 1,195 ft.

R. N. File 1 Anbuehl, CW½ E½ NW 22-6n-4w. Dry. TD 1,950 ft.

Crawford County: R. N. Kintop 1 Batcher, NW SW SW 25-6n-12w. Dry. TD 3,107 ft.

Cumberland County: J. G. Ellis 1 Carver, NW NW NW 34-11n-10e. Dry. TD 595 ft.

Jefferson County: L. G. Ehrat 1 Szramkowski, SW NW NE 33-2s-1e. Dry. TD 3,754 ft.

Washington County: The Texas Co. 1 McWilliams Jr., NW NW SE 5-2s-2w. Dry. TD 3,125 ft.

E. A. Obering 1 Koch, SW SW NE 34-1s-5w. Dry. TD 3,000 ft.

White County: Arrow Drilling Co. 1 Howell, SE SE NW 27-5s-9e. Dry. TD 3,296 ft.

A. J. Slagter Jr. 1 Reinwald, NW NW NE 26-4s-9e. Dry. TD 3,313 ft.

INDIANA

Dubois County: R. C. Fisher 1 Ring, NE NW NW 13-3s-6w. Dry. TD 470 ft.

G. & W. G. Drilling Co. 1 Higeman, SE NW NW 25-2s-6w. Dry. TD 1,448 ft.

J. H. Gilliam 1 Kunkle, NE NW SE 13-3s-5w. Dry. TD 930 ft.

Gibson County: Paco Petroleum Co. 1 Hyslop, NE SW SE 32-2s-10w. Dry. TD 2,216 ft.

Spencer County: F. Mallotte 1 Poth, SE SE SW 30-4s-5w. Dry. TD 1,197 ft.

Mulzer Bros. 1 Cadick, NW SW SW 12-7s-6w. Dry. TD 1,861 ft.

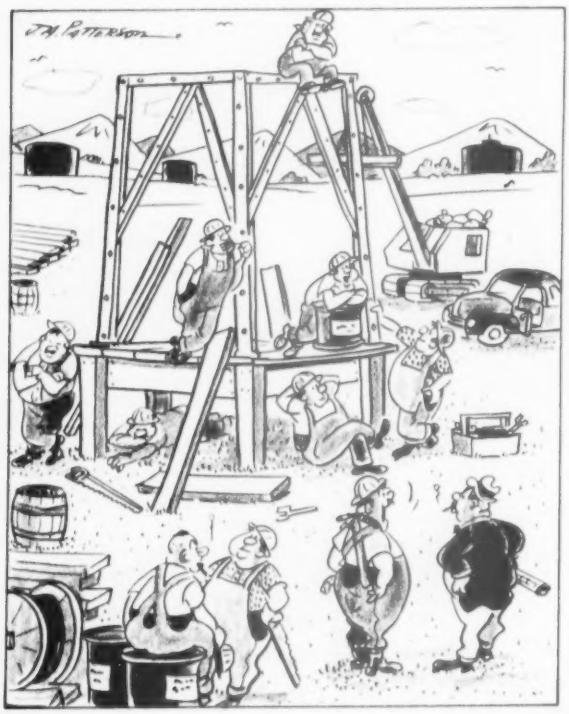
Vandenburg County: J. S. Young Jr. 1 Cummings, SE SE NE 12-5s-10w. Dry. TD 944 ft.

Vigo County: F. B. Cline 1 White, SW SW NE 15-11n-8w. Dry. TD 1,604 ft.

MICHIGAN

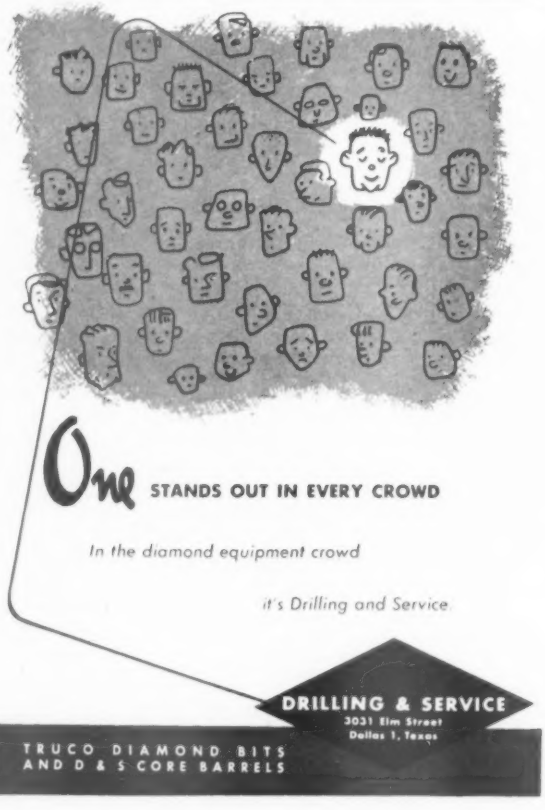
Mecosta County: Fred F. Uhl 1 Block et al, SE NE NW 20-13n-8w. Dry. TD 3,082 ft. in Traverse.

Newaygo County: Miller Thompsen Construction Co. 1 Murdick & Murdick, SE SW NE 27-12n-13w. Dry. TD 2,783 ft. in Dundee.



THE OIL AND GAS JOURNAL

"Oh, no sir, th' boys don't mind you comin' out here to see what's been done—they just wish you'd wait until something has."


One STANDS OUT IN EVERY CROWD
In the diamond equipment crowd
it's Drilling and Service
DRILLING & SERVICE
3031 Elm Street
Dallas 1, Texas
TRUCO DIAMOND BITS
AND D & S CORE BARRELS

Otsego County: Brazos Oil & Gas Co. BE-1 State-Charlton, SW SE SW 13-29n-1w. Dry. TD 3,705 ft. in Richfield.

KENTUCKY

Henderson County: R. E. Hupp 1 O'Bryan, NW NW SW 3-Q-25. Dry. TD 2,313 ft.
Ryan Oil Co. 1 Trent, NW SW NE 15-P-22. Dry. TD 2,740 ft.
Hopkins County: Atkins and Hale 3 Brown, NW SW SW 6-J-22. Dry. TD 1,710 ft.

OHIO

Lake County: I. C. Beck Co. 1 C. Reynolds, Corporation Mentor Village, IP 3,120 M.c.f. daily. (New pool.)

WEST VIRGINIA

Randolph County: Middle Fork district: Nollem Oil & Gas Corp. 2 Moore Keppel & Co., elev. 2,638 ft., 800,000 cu. ft. gas, after Sandfrac, rock pressure in one week 620 psi., Fifth sand, 1,930-1,964 ft., gas 1,951-1,964 ft., TD 1,966 ft.

ALABAMA

Escambia County: Durbin Bond & Co. 1 McMillan trust, C SW NW 9-3n-10e. Dry. TD 5,721. Elev. 260 ft., Chalk 2,732 ft., Eutaw 4,087 ft., marine Tuscaloosa 4,910 ft., Massive 5,312 ft., lower Cretaceous 5,508 ft.
Gulf Refining Co. 1 First National Bank of Mobile, 27-2n-8e. Dry. TD 6,903 ft.
Sunnyland Contracting Co. 1 Alger-Sullivan, C NE NE 29-2n-6e. Dry. TD 6,909 ft. Elev. 301 ft., Chalk 3,760 ft., marine Tuscaloosa 6,095 ft., lower Tuscaloosa 6,354 ft., Massive 6,506 ft., lower Cretaceous 6,772 ft.

MISSISSIPPI

Forrest County: R. R. Frankel 1 U.S.A., 27-1n-12w. Dry. TD 8,921 ft. Elev. 208 ft., Chalk 5,965 ft., base marine Tuscaloosa 8,274 ft.
Wilkinson County: B. Serio and Justiss & Mears 1 Rosenblatt, 28-2n-4w. Dry. TD 8,258 ft. Elev. 51 ft., Wilcox 6,063 ft., base Baker shale 7,838 ft.

SOUTH LOUISIANA

Beauregard Parish: H. L. Hunt 1 Long Bell, 11-5s-8w. Dry. TD 8,755 ft.
Point Coupe Parish: Justiss-Mears 1 Patterson, 19-6s-10e. Dry. TD 9,312 ft.
St. Bernard Parish: Union Producing Co. 1 State Lease 1699, Lake Borgne. Dry. TD 10,550 ft.

NORTH LOUISIANA

Catahoula Parish: Barnett Serio et al 1 Fairbanks, 1,980 ft. N and 2,270 ft. W of SEc 22-7n-6e. Dry. TD 5,825 ft.
Union Parish: American Republics Corp. 1-18 A.R.C.-Olin-Interstate Fee, 3,308 ft. N and 1,682 ft. E of SWc 18-20n-3e. Dry. TD 10,095 ft.
T. L. James & Co. 1 Nelson, 330 ft. N and 725 ft. W SEc NE 2-22n-3w. Dry. TD 9,670 ft.

ARKANSAS

Monroe County: Seaboard Oil Co. "S" Core test, SE SW SE 12-4n-3w. Dry. TD 2,285 ft.
Ouachita County: Jack Carnes et al 1 Fee, 1,650 ft. N and 330 ft. E of C 3-14s-18w. Dry. TD 2,132 ft.

OKLAHOMA

Garvin County: Max Pray 1 Blythe, SE SE SE 29-1n-1e. Dry. TD 2,030 ft.
Hughes County: Beach & Talbot and Pure Oil Co. 1 Huffman, NW SW NE 11-8n-12e. Dry. TD 5,026 ft.
Jefferson County: Mack Oil Co. 1 McMenary, NW NW NW 7-6s-8w. Dry. TD 4,983 ft.
Lincoln County: Mid-Continent Petroleum Corp. 1 Randolph, NE NE SE 23-13n-3e. Dry. TD 4,570 ft.
Thompson & Lee 1 Telford, NW SW NE 5-13n-4e. Dry. TD 5,218 ft.
Service Drilling Co. 1 Clark, NW NW SE 30-17n-2e. Dry. TD 5,068 ft.
Logan County: Davon Oil Corp. 1 Woods, SW SW SE 10-16n-1w. Dry. TD 5,709 ft.
Okfuskee County: R. B. Patterson 1 Rodgers, SE NW NE 6-11n-10e. Dry. TD 3,235 ft.
Mid-Continent 1 Fender, SE NW SE 7-12n-10e. Dry. TD 3,901 ft.
Pawnee County: Service Drilling Co. 1 Vreeland, SW SW NE 27-21n-7e. Dry. TD 2,980 ft.
Barton & Rich Drilling Co. 1 Wheeler, SW NE NE 36-23n-5e. Dry. TD 3,226 ft.
Payne County: Davidor & Davidor 1 USA, NW NE NE 10-18n-1e. Dry. TD 5,155 ft.
T. W. & J. M. Loffland 1 Meyers, C SE NE 7-18n-1w. Dry. TD 5,681 ft.
Pottawatomie County: Davidor & Davidor 1 Reynolds, SE SW SE 29-6n-2e. Dry. TD 5,700 ft.
Tillman County: S. D. Johnson 1 Parris, SW SW NW 10-3s-19w. IPF 80 BOPD, Arbuckle detrital 5,516-21 ft., 11/64-in., 40.4°. TD 5,614 ft. (Oil discovery.)
Woodward County: Woodson Oil Co. 1 Patterson, C SE SE 27-22n-17w. Dry. TD 7,487 ft.

KANSAS

Barton County: G.M.R. 1 Werher, SW SW SW 21-17s-12w. Dry. TD 3,485 ft.
Cowley County: Fred Ayesh 1 Beymer, SE SE NE 10-32s-7e. IPF 25 BOPD, 2,214-22 ft. 2,000 M.c.f. gas. TD 3,025 ft. (oil discovery.)
Ellis County: Victor Drilling Co. 1 Herman, SW SE SE 10-12s-17w. Dry. TD 3,720 ft.
Lindas Oil Co. 1 Philap Ranch, SW SW NW 4-15s-17w. Dry. TD 3,650 ft.
Norton County: Jones, Shelburne & Farmer 1 Radloff, NE NE SW 2-4s-24w. Dry. TD 3,833 ft.
Pawnee County: Toklan Production Co. 1 Winkler, NW NW SE 15-20s-19w. Dry. TD 4,569 ft.
Reno County: Armer 1 Ramer, NE NE NE 27-24s-8w. Dry. TD 3,800 ft.
Rooks County: Oil Trading-Braden Drilling Co. 1 Chesney, NW NW SE 29-10s-16w. Dry. TD 3,713 ft.
Sherman County: Slosson 1 Riley, SE NE SW 14-9s-40w. Dry. TD 5,316 ft. Mississippi 5,230 ft.
Stafford County: Lawson Petroleum-Skelly 1 Dickson, NW SE SW 17-25s-11w. Dry. TD 4,202 ft.
Sumner County: The Texas Co. 1 Hammers, SW NW NW 1-30s-3w. Dry. TD 4,333 ft.
Deep Rock Oil Corp. 1 Martin, SE SE SW 26-31s-3w. Dry. TD 3,984 ft.
Trego County: United Drilling Co. 1 Hubalek, NW NW SE 19-12s-22w. Dry. TD 4,152 ft.

NEBRASKA

Cheyenne County: Ben F. Brack 1 Reitz, SE SE SW 23-14n-53w. Dry. TD 5,581 ft.

SOUTH DAKOTA

Custer County: Hunt Oil Co. 1 Peterson, C NW NW 7-20n-3e. Dry. TD 9,045 ft. Cambrian 9,005 ft.
Miner County: Rocky Ridge Development Co. 1 Hale, NE NE 25-108n-57w. Dry. TD 1,330 ft.
Ziebach County: Kerr-McGee Oil Industries, Inc. 1 Brammer, SE NW 20-13n-20e. Dry. TD 6,300 ft. Winnipeg sand 6,217 ft.

WILDCAT COMPLETIONS

CALIFORNIA

Butte County: Honolulu Oil Corp. 1 Honolulu-Humble-State, 16-17n-1e. Dry. TD 3,700 ft.
Fresno County: L. A. Harnish, Oper. 1 Well, 32-20s-16e. Dry. TD 9,856 ft.
Humbolt County: B-N Development Corp. 1 Duff Unit, 21-4n-1w. Dry. TD 3,438 ft.
Kern County: D. K. Partnership-3 65-12 Dyer, 12-11n-19w. Dry. TD 7,302 ft.
Ferguson & Bosworth 3 Layman-B, 18-28s-20e. Dry. TD 1,492 ft.
Kern County Land Co. 67-A K.C.Y., SW SE 12-31s-25e, IPF 3,500 M.c.f. gas through 34-in. choke, perforations 6,703-15 ft., TD 6,716 ft. (New gas zone discovery on southwest flank of Coles Levee field.)
Macson Oil Co. 1 C.C.M.O., 28-29s-21e. Dry. TD 2,020 ft.
Quinby Oil Inc. 1 Well, 13-11n-18w. Dry. TD 892 ft.
R. S. Rheem, Operator 15-B Theta, 17-28s-20e. Dry. TD 2,200 ft.
Orange County: B & H Oil Co. 1 Stockwell Pool, 33-3s-9w. Dry. TD 5,708 ft.
Wilson Oil Co. 1 Peterson, 11-6s-11w, IPF 700 bbl. in 26 hours, 27.4° gravity, perforations 5,296-5,429 ft., (OWRD) redrilled TD 5,460 ft. (New fault-block pool discovery in Huntington Beach field.)
San Benito County: D. Frankel, Opr. 1 Lewis-U.S.I., 34-16s-12e. Dry. TD 822 ft.
Santa Barbara County: Monterey Oil Co. 1 L. C. Thomas, 15-9n-33w. Dry. TD 6,825 ft.
Murphy Brothers, Ltd., 74-6 Sinclair, 6-7n-35w. Dry. TD 1,821 ft.
Santa Clara County: L. C. Gould 1 Gilroy City, 9-11s-4e. Dry. TD 3,520 ft.
Tulare County: San Joaquin Assoc. 1 Bowen, 35-24s-28e. Dry. TD 806 ft.
Ventura County: Humble Oil & Refining Co. 1 Limoneira, 23-3n-22w. Dry. Deepened from 10,727 ft., new TD 15,474 ft.

WYOMING

Fremont County, Green Mountain area: Natural Gas & Oil Co. 1 Government, NW NW SE 12-28n-94w. Dry. TD 6,219 ft. 3rd. Frontier 3,487 ft.
Hot Springs County, Lysite: Blackwell Oil & Gas Co. 1 Government, NE SE SE 8-42n-90w. Dry. TD 4,225 ft. Tensleep 4,200 ft.
Johnson County, North Fork: Howard Atha 1 Dawson, SW NE NE 19-44n-81w. Dry. TD 7,130 ft. suspended.
Laramie County, Pine Bluffs: Ginther, Warren & Ginther 1 Fritz, C SE NE 36-14n-61w. Dry. TD 9,015 ft.
Washakie County, South Frisby unit: Socony-Vacuum-Pegasus Division T82-26 (Unit 2), SE NE NE 26-47n-92w. Dry. TD 10,833 ft. Phosphoria 10,736 ft.

COLORADO

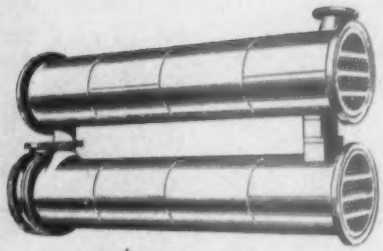
Adams County, Little Beaver area: National Drilling (Col.-Tex) 1-4 Hough, SW NW NE 13-2s-57w. Dry. TD 5,455 ft. Skull Creek 5,426 ft.
S. D. Johnson 1 Park, NE NW NE 32-2s-57w. Dry. TD 5,550 ft.
S. D. Johnson 1 Nelson, NE NW NE 4-3s-57w. Dry. TD 5,661 ft.
Jackson County, Lake Creek anticline: F. Kirk Johnson et al 1 Big Horn Ranch, Inc., C NW NW 27-10n-81w. Dry. TD 2,381 ft. Chugwater 2,276 ft.
Logan County: S. D. Johnson 1 Elliott, SW SW SW 31-7n-48w. Dry. TD 4,297 ft.
Plains Exploration, Dunn & Boreing 1

(Continued on page 195)

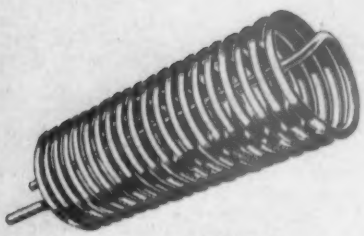
HAYNES Alloy Tubing

Trade-Mark

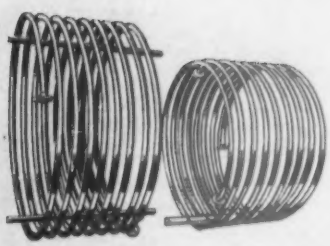
FOR SEVERE SERVICE CONDITIONS



Heat Exchangers



Fluid Lines



Coils

Tubing made of HAYNES alloys gives long, uninterrupted service under severe conditions of heat, corrosion, or oxidation. The tubing can be obtained in four different alloys, each having a particular combination of unusual properties to combat certain service conditions. The chart below shows some of the media these alloys resist. Typical applications are heat exchangers, coils, calandrias, and fluid lines.

All four HAYNES alloys are supplied in welded or welded and cold drawn tubing. Most common welding methods—including metallic-arc and HELIARC welding—can be used in fabricating the tubing installations. If you wish further information about HAYNES alloy tubing, contact the nearest Haynes Stellite Company district office.

USE TUBING OF	FOR RESISTANCE TO
HASTELLOY Alloy B (nickel-molybdenum-iron)	Hydrochloric acid, wet hydrogen chloride gas, sulphuric acid, phosphoric acid, organic acids, high temperatures.
HASTELLOY Alloy C (nickel-molybdenum-chromium-iron)	Nitric acid, free chlorine, acid salts, hydrochloric acid, sulphuric acid, phosphoric acid, organic acids, sulphurous acid, high temperatures.
MULTIMET Alloy (cobalt-chromium-nickel-iron)	Oxidation, high temperatures.
HAYNES Alloy No. 25 (cobalt-chromium-tungsten-nickel)	Oxidation, high temperatures, carburization, wet chlorine, nitric acid.

HAYNES alloys

TRADE-MARK

"Haynes," "Hastelloy," "Heliarc," and "Multimet" are trade-marks of Union Carbide and Carbon Corporation.

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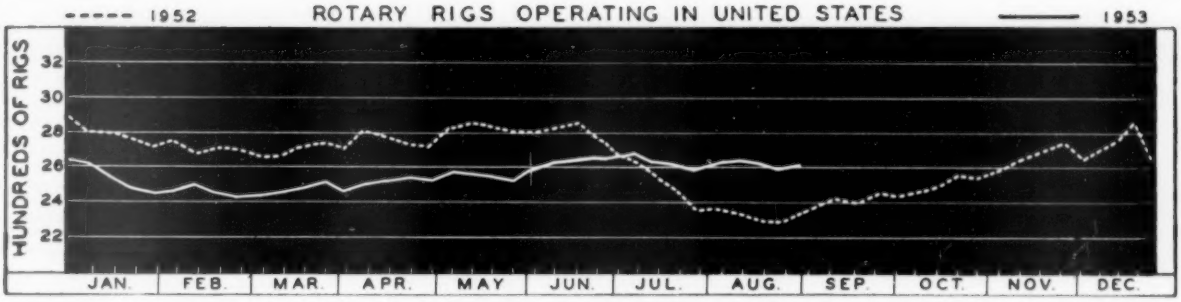
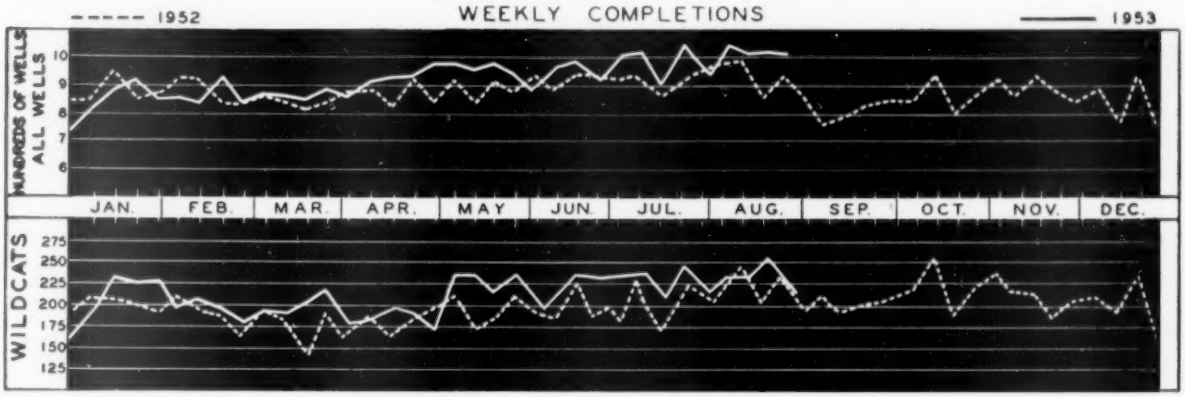




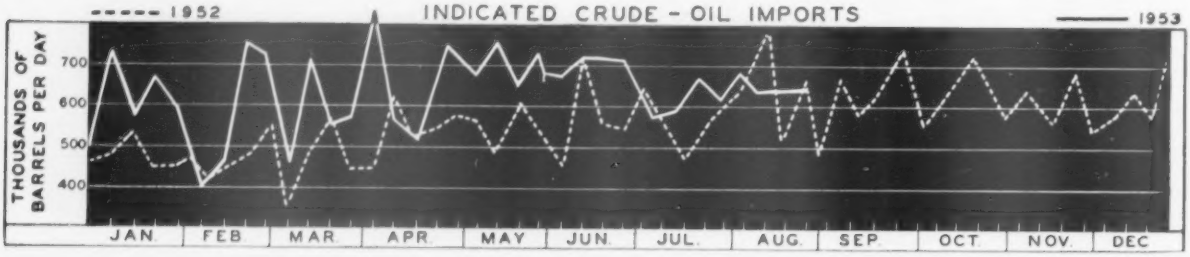
CURRENT STATISTICS

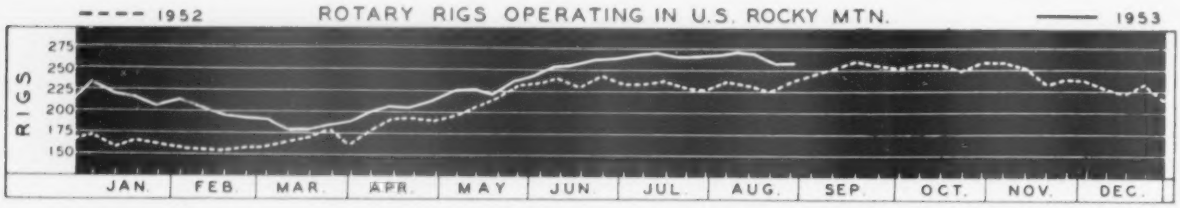
EXPLORATION

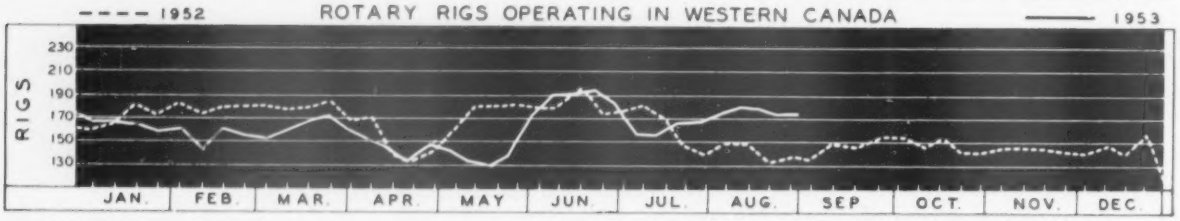
WEEKLY WELL COMPLETIONS . . . WEEK ENDED AUGUST 29, 1953

	Total of all wells					Aug. 29		Wildcat completions and discoveries					Cumulative total, 1953				
	Comp.	Oil	Gas	Dry	Footage	1953	1952	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	18	9	0	*9	26,375	484	529	0	0	0	0	0	0	0	0	0	0
Pennsylvania	47	21	5	‡21	86,200	1,200	1,290	0	0	0	0	0	0	0	3	11	14
West Virginia	17	3	11	3	40,317	412	398	0	0	1	0	1	0	0	7	3	10
Ohio	21	9	3	‡9	37,987	688	693	0	0	1	0	1	2	0	2	12	16
Indiana	33	10	1	22	52,710	853	833	0	0	0	8	8	11	0	2	225	238
Kentucky	30	9	6	15	60,499	726	850	0	0	0	3	3	6	0	1	122	129
Illinois	49	24	0	25	119,106	1,238	1,328	0	0	0	9	9	4	0	0	271	275
Michigan	12	6	1	5	33,339	391	469	0	0	0	3	3	11	0	5	162	178
Kansas	81	39	4	‡38	275,499	3,216	3,115	1	0	0	12	13	71	0	27	502	600
Nebraska	2	0	0	2	9,231	218	177	0	0	0	1	1	14	0	3	93	110
Oklahoma	146	79	13	§54	507,178	4,814	3,840	1	0	0	15	16	78	6	25	427	536
Texas	336	187	17	132	1,532,482	11,400	12,019	13	0	2	90	105	588	41	132	2,799	3,560
North Central (Dist. 7-B & 9)	133	78	0	55	441,176	4,294	3,859	7	0	0	33	40	306	0	14	1,140	1,460
West (Dist. 7-C & 8)	67	47	2	18	381,737	2,447	3,725	2	0	2	14	18	116	2	12	442	572
Panhandle (Dist. 10)	17	6	10	1	58,884	532	469	0	0	0	0	0	0	2	0	15	17
Eastern (Dist. 5 & 6)	11	2	0	9	67,375	527	565	0	0	0	6	6	14	2	4	180	200
Gulf Coast (Dist. 2 & 3)	40	20	4	16	253,696	1,682	1,786	0	0	0	12	12	78	16	54	441	589
Southwest (Dist. 1 & 4)	68	34	1	33	329,614	1,918	1,615	4	0	0	25	29	74	19	48	581	722
Louisiana	40	26	2	12	261,065	1,695	1,523	0	0	0	6	6	51	25	16	231	323
Northern	21	14	2	5	87,278	687	811	0	0	0	3	3	7	2	2	84	95
Southern	19	12	0	7	173,787	1,008	712	0	0	0	3	3	44	23	14	147	228
Arkansas	10	6	0	4	38,550	326	252	0	0	0	2	2	10	0	0	73	83
Mississippi	6	2	0	4	49,753	244	241	0	0	0	2	2	12	1	4	115	132
Southeastern States	3	0	0	3	19,533	96	44	0	0	0	3	3	1	0	0	77	78
Montana	6	5	0	1	16,218	254	181	0	0	0	0	0	8	0	0	65	73
Wyoming	25	18	0	7	135,519	461	436	0	0	0	5	5	15	0	0	85	100
Colorado	23	8	1	14	121,015	442	289	0	0	0	12	12	19	0	9	200	228
Utah	0	0	0	0	0	47	46	0	0	0	0	0	2	0	4	26	32
New Mexico	28	10	12	6	179,597	898	698	1	0	0	4	5	14	0	7	82	103
California	59	39	2	‡18	282,153	1,686	1,603	1	0	1	15	17	41	0	8	375	424
North Dakota	5	5	0	0	42,406	171	47	0	0	0	0	0	7	0	0	37	44
Miscellaneous (S. D., Mo.)	13	2	0	11	28,467	54	83	0	0	0	3	3	1	0	3	34	38
Total United States	1,010	517	78	415	3,955,199	32,014	30,984	17	0	5	193	215	966	73	258	6,027	7,324
Total previous week	1,020	510	88	422	4,155,761			31	3	12	209	255	949	73	253	5,834	7,109
Total August 30, 1952	852	405	87	360	3,375,639			18	2	7	167	194	939	60	168	5,601	6,768

Service wells included: *9, ‡18, ‡1, §2.





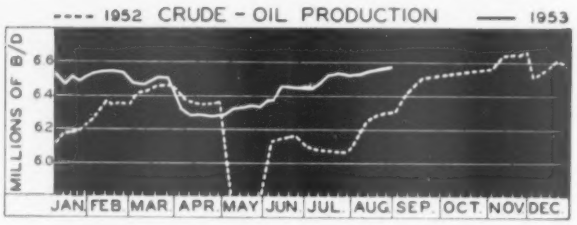


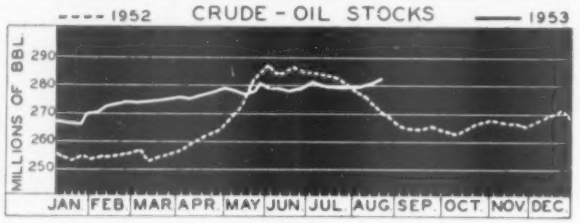
DAILY AVERAGE PRODUCTION FOR WEEK

	August 29 Crude oil	August 29 Lease condensate	August 29 Total	Aug. 22 total
Alabama	5,200		5,200	5,000
Arkansas	77,700	400	78,100	78,100
California	1,009,800		1,009,800	1,008,400
Colorado	109,500		109,500	107,700
Eastern	59,200		59,200	59,200
Florida	1,550		1,550	1,550
Illinois	163,600		163,600	163,600
Indiana	34,000		34,000	34,700
Kansas	334,700		334,700	340,200
Kentucky	31,500		31,500	30,800
Louisiana	663,975	32,900	696,875	696,675
North	107,800	2,900	110,700	110,500
South	556,175	30,000	586,175	586,175
Michigan	35,800		35,800	30,700
Mississippi	93,100	2,300	95,400	96,200
Montana	31,400		31,400	31,400
Nebraska	16,700		16,700	17,900
New Mexico	199,200	750	199,950	199,950
Oklahoma	561,400		561,400	557,500
Texas	2,840,725	43,850	2,884,575	2,884,575
Dist. 1	39,675	350	40,025	40,025
Dist. 2	157,475	5,700	163,175	163,175
Dist. 3	454,100	22,000	476,100	476,100
Dist. 4	270,900	5,800	276,700	276,700
Dist. 5	49,750	350	50,100	50,100
Dist. 6	128,700	4,900	133,600	133,600
East Texas field	246,600		246,600	246,600
Dist. 7-B	120,625	50	120,675	120,675
Dist. 7-C	173,350	3,800	177,150	177,150
Dist. 8	934,275	500	934,775	934,775
Dist. 9	188,775	350	189,125	189,125
Dist. 10	76,500	50	76,550	76,550
Utah	5,400		5,400	5,800
Wyoming	212,000		212,000	211,600
North Dakota	13,800		13,800	14,300
Total U. S.	6,500,250	80,200	6,580,450	6,575,850
Change from previous week, up			4,600	
Canada	257,900		257,900	265,200

Total U. S. production January 1-August 29 1,555,397,450 bbl.
Same period last year (crude plus cond.) *1,481,724,025 bbl.

*Includes 21,070,035 bbl. condensate.



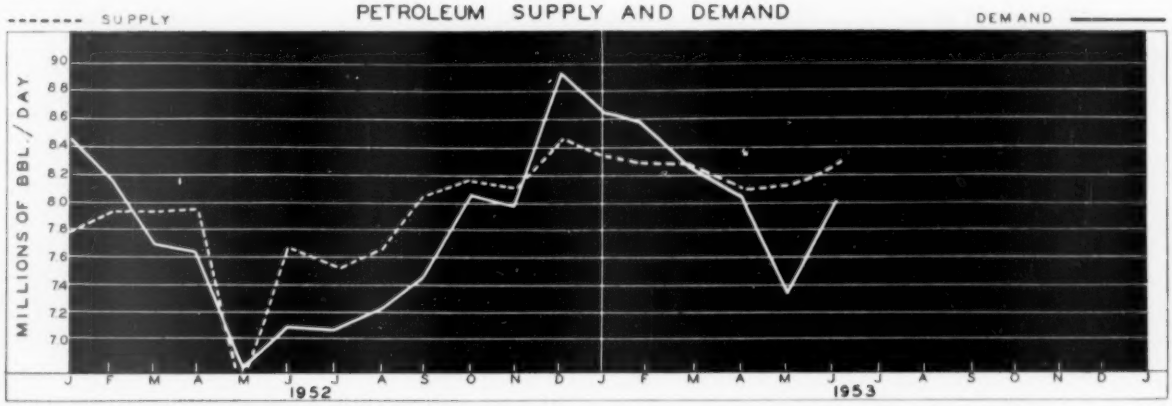


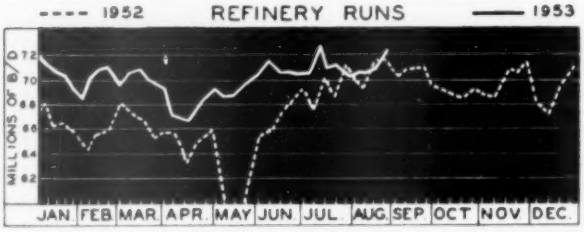
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

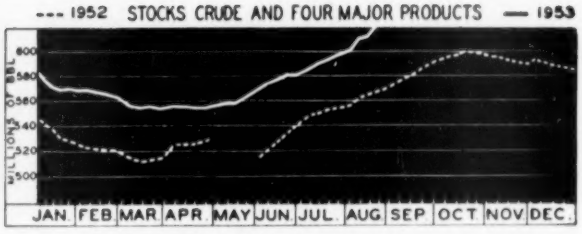
(Thousands of barrels)

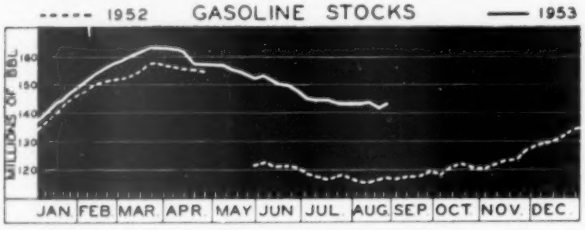
	Aug. 22, '53	Aug. 15, '53	Aug. 23, '52
Pennsylvania Grade	2,716	2,715	2,385
Other Appalachian	2,326	2,253	2,150
Illinois, Indiana, Michigan	12,539	12,261	12,673
Arkansas	2,825	2,934	3,109
Louisiana	16,748	16,711	14,523
North	2,885	2,884	2,352
Gulf	13,863	13,827	12,171
Mississippi	3,581	3,515	3,660
New Mexico	9,231	8,165	7,451
Oklahoma and Kansas	39,398	39,479	39,354
Texas	132,916	132,100	129,829
East Texas	11,578	11,149	13,241
West Texas	58,469	58,681	57,784
Texas Gulf	28,605	28,052	27,065
Other Texas	34,264	34,218	31,739
Rocky Mountain	17,084	16,997	14,612
California	33,376	33,031	30,584
Foreign	†10,018	9,984	8,861
Total	282,758	280,145	269,191

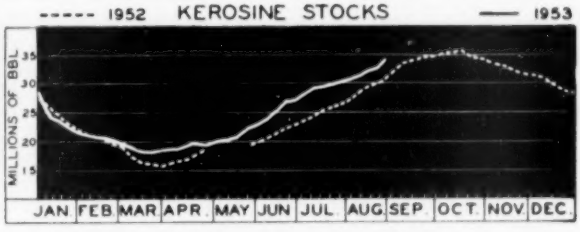
*Bureau of Mines. †Includes 2,871,000 bbl. in California.

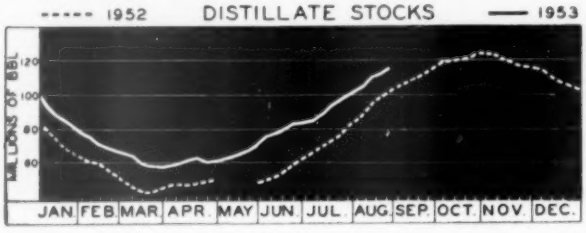


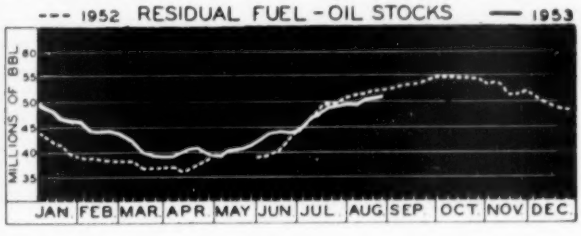










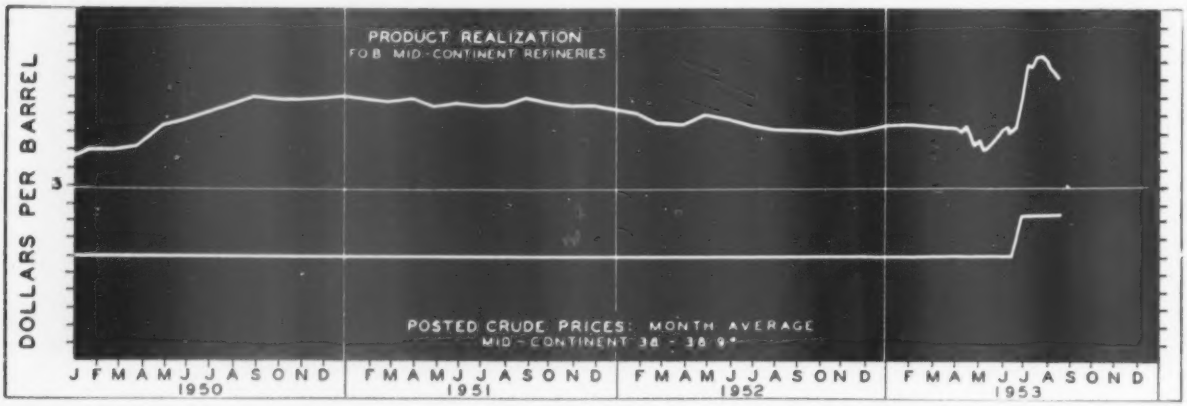


A.P.I. REFINERY REPORT, AUGUST 29

(Thousands of barrels)

District—	Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.	Stocks† Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, August 1952 Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.
East Coast	1,059	436.1	46.7	237.9	229.7	33,826	14,048	40,678	13,250	1,062	428.9	48.0	239.5	225.2
Appalachian:														
District 1	91	43.4	3.3	19.0	8.8	3,350	615	1,362	724	105	42.3	5.0	14.0	9.3
District 2	95	50.4	5.8	11.1	13.0	1,563	553	557	148	76	41.7	1.7	15.4	14.2
Ind., Ill., Ky.	1,375	728.2	76.4	236.6	157.1	28,464	8,755	20,694	4,599	1,350	708.6	78.5	247.7	167.5
Okla., Kans., Mo.	650	373.6	23.1	142.6	54.8	14,797	2,407	12,247	1,158	610	342.7	16.0	143.7	60.3
Inland Texas	274	182.7	9.3	45.3	36.6	5,645	625	1,882	1,613	258	172.4	12.3	45.1	36.4
Texas Gulf Coast	1,699	817.7	120.7	390.6	215.0	18,895	3,763	14,728	6,986	1,738	781.3	139.4	442.0	282.0
La. Gulf Coast	564	279.9	22.6	140.0	51.3	7,880	2,757	7,360	1,753	527	248.4	55.7	141.1	56.2
N. La. and Ark.	83	31.4	6.0	20.4	3.3	3,165	564	799	125	86	34.0	6.5	21.4	6.1
Rocky Mountain:														
New Mexico	20	12.9		3.0	3.9	200		38	29	19	12.1	0.2	2.9	3.9
Other Rocky Mtn.	251	117.1	2.9	60.1	41.3	4,891	290	2,655	993	243	113.3	5.3	45.9	41.9
California	1,073	476.3	3.3	178.7	360.3	20,611	348	13,568	19,534	1,044	451.1	6.2	155.3	349.3
Aug. 29, 1953	7,234	3,549.7	320.1	1,485.3	1,175.1	143,287	34,725	116,568	50,912	7,118	3,376.8	374.8	1,514.0	1,252.3
Aug. 22, 1953	7,109	3,597.4	333.4	1,474.9	1,279.4	142,334	33,769	113,601	50,844					
Aug. 30, 1952	7,110	3,428.0	380.6	1,464.7	1,262.7	117,240	32,080	102,295	52,296					

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipe lines.


PRODUCT REALIZATION
F.O.B. MID-CONTINENT REFINERIES
DOLLARS PER BARREL
3
POSTED CRUDE PRICES: MONTH AVERAGE
MID-CONTINENT 38 - 38.9°
J F M A M J J A S O N D
1950
F M A M J J A S O N D
1951
F M A M J J A S O N D
1952
F M A M J J A S O N D
1953

In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate and fuel oil. Realization averaged $3.61 for week ended August 22, $3.64 for previous week, and $3.33 for August 1952. The above trend information is based on volumes and current prices and therefore does not reflect changes in operating costs.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of September 2, 1953. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline	11.125-11.625	13-13.8	11.25-11.75
Premium gasoline	12.25-12.875	14.5-14.8	12.5-12.75
42-44 w.w. kerosine	8.875-9.25	10.15-10.4	9-9.5
No. 2 straw fuel oil	7.875-8.25	8.9-9.4	8-8.5
No. 6 residual	$1.10-1.25	$2.15-2.40	$1.80-1.90

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	6.375	5.875	6.125
Grade 18-55	7.65	7.15	7.40

LUBRICATING OILS

South Texas

200 vis., No. 2-3 neutral	13.75
750 vis., No. 3-4 neutral	16.75
2,000 No. 5-6 neutral	18-18.75

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	20.5-21.5
200 vis, No. 3 neutral, 0-10 pp.	14.5

Western Pennsylvania

145-155 vis., 10 p.t. bright stock	25.5
180 vis., 10 p.t. neutral	27.5

WAX

Mid-Continent

132-134 A.M.P.	6.0

WITHDRAWAL of a low posting of 8.9 cents a gallon for barge delivery of No. 2 fuel in New York Harbor may be the first sign of the expected strength in the distillate market later this month. However, reports indicate that material is still available at 8.9 cents despite normal postings of 9.15 cents and up by most suppliers.

The voluntary summer-fill discount, amounting to 0.5 cent a gallon for upper East Coast states, is scheduled to be withdrawn on September 30. The rush by secondary suppliers to fill tanks just before the deadline is expected to give a temporary boost to the heating-oil market. The high level of primary distillate inventories in Gulf Coast and East Coast districts will continue to put pressure on the market. Gulf-East Coast stocks on August 22 totaled 61,313,000 bbl., representing an increase of almost 25 per cent over last year and a gain of 47 per cent over the corresponding period in 1951.

Gulf - East Coast distillate stocks climbed 14,600,000 bbl. last year between the third week in August and the last of October. In 1951, the increase for the period was 12,600,000 bbl. Some suppliers are convinced that primary storage facilities in the districts will not hold 12,000,000 bbl. in addition to the 61,000,000 now on hand. Unless the movement to primary and consumer storage in September is unusually large, distillate production in the districts will have to be cut back until cold weather brings increased distillate demand.

Some Group 3 gasoline on the pipe line has been sold for 11.125 cents a gallon plus pipe-line transportation. However, it is believed that the volume moved at this price has been smaller than reports would indicate after passing through several information sources. The Group 3 residual market remains very firm, particularly in Kansas. Distillate stocks in District 2 are lower than at this time last year.

CRUDE PRICES GRAVITY SCHEDULE

	Signal Hill, Calif.*	Okla-homa, Kansas	Gulf Coast Tex.†	West Tex.‡
14-14.9	$1.87			
15-15.9	1.93			
16-16.9	1.99			
17-17.9	2.05			
18-18.9	2.11			
19-19.9	2.18			
20-20.9	2.24	$2.50		$2.37
21-21.9	2.30	2.52		2.39
22-22.9	2.37	2.54		2.41
23-23.9	2.45	2.56		2.43
24-24.9	2.53	2.58	$2.91	2.45
25-25.9	2.61	2.60	2.93	2.47
26-26.9	2.69	2.62	2.95	2.49
27-27.9	2.76	2.64	2.97	2.51
28-28.9	2.83	2.66	2.99	2.53
29-29.9	2.91	2.68	3.01	2.55
30-30.9	2.97	2.70	3.03	2.57
31-31.9	3.04	2.72	3.05	2.59
32-32.9	3.12	2.74	3.07	2.61
33-33.9		2.76	3.09	2.63
34-34.9		2.78	3.11	2.65
35-35.9		2.80	3.13	2.67
36-36.9		2.82	3.15	2.69
37-37.9		2.84	3.17	2.71
38-38.9		2.86	3.19	2.73
39-39.9		2.88	3.21	2.75
40 and above		2.90	3.23	2.77

*Standard Oil Co. of California. †Upper Texas Gulf Coast. ‡Includes New Mexico Permian.

Prices East of California effective June 15, 1953. California prices effective February 16, 1953. Pennsylvania Grade prices effective August 1, 1953.

FLAT CRUDE PRICES

Representative posted schedules per barrel.

Louisiana:	
Cotton Valley (distillate)	$3.00
Cotton Valley (Holloway crude)	2.95
Texas:	
East Texas	2.90
Chapel Hill	2.83
Conroe	3.13
Van	2.73
Pennsylvania Grade:	
Bradford	4.55
Southwest Pennsylvania	4.11
West Virginia	4.05
Ohio	4.04
Illinois Basin	3.02

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JOY 300 Drilling Rig butane powered, mounted on Brockaway 6x6 truck, 3500 feet 3½ inch drill pipe. Auxiliary mud pump and butane engine as separate unit. All tools and equipment included. This rig in first-class working condition and ready to go to work immediately. Call or write Steele Brothers, Crete, Nebraska. Phone 127.

SALES and rentals of cable drilling and fishing tools, casing and equipment, from the Southwest's largest stock of used cable tools and oil field supplies. Degen Pipe and Supply Co., Tulsa, Oklahoma.

FOR SALE: TUBING TOOL JOINTS, 197 sets, slightly used, Gulf Tool Company, Model A-200, double-box type, for use with 2" EUE 8rd. thd. API tubing. Slick-Urschel Oil Company, 2000 Milam Building, San Antonio, Texas. Phone: Fannin 5371.

USED MATERIAL FOR SALE: 7000'—7" OD 24# 10Vthd Seamless R-2 Grade C Casing. 57000'—7" OD 24# 10Vthd L.W., R-1 Casing. 75000'—2" EUE 4.70# R-2 10Vthd Seamless Tubing. 6,000'—4½" OD EUE J-55 8RD R-1 Seamless—good for Casing. 75000' —⅝ and ¾" Sucker Rods. 15—20HP T. C. on skids 54" stroke Pumping Units. Sabine Pipe & Supply Co., Phones 3094—3095, Kilgore, Texas.

1—NEW & UNUSED WOOLEY (Houston Armature Works) 25 K. W., 31.30 K.V.A., 4-Wire, 3-60-220, or 1-60-110, 1200 RPM, AC Generator, General Electric Type B Exciter 115 Volt, Direct Connected to New Model K428, 6 Cylinder Buda Gas Engine, Complete With All Accessories, Mounted on Steel Skid, F.O.B. Tulsa, Okla.—$2250.00. 1—Practically New (Excellent Condition) Model S, Century Electric Co., 30 K.W., 37.05 KVA, 3-60-127-220, 1800 RPM, AC Generator With Exciter General Electric Panel Board, Direct Connected to Model DTD 317 Buda Diesel Engine, Complete with All Accessories, Mounted on Steel Skid, F.O.B. Tulsa, Okla.—$2250.00. 1—Practically New (70 Hrs. Service) Lombard (Comparable to Model 3490 Gould) Model WH, 1000 GPM, 281 Foot Head, 120# Pressure, 1800 RPM, Split Case, Single Stage, Centrifugal Pump, 6" Suction, 4" Discharge, Direct Connected to Model 33R, 6 Cylinder Continental Engine 100 H.P. at 1800 RPM. Complete With All Accessories, Mounted on Steel Skid, F.O.B. Tulsa, Okla.—$1500.00. H. A. McCarthy, 310 Thompson Bldg., Tulsa, Okla.

2—4" x 14" Type VSF Clark Cylinders for Angle Type Compressors. Serial Nos. 17707 & 17708—New. 1—4¼" x 14" Ditto, Ser. 17709—Used but Factory overhauled since last used. 2—4¾" x 14" Type VTH Ditto, Ser. Nos. 8678 & 8679. Used but factory overhauled since last used. The compressors cylinders may be inspected in our place of business at 1523 S. E. 29th at Oklahoma City. Berg-Dorf Pipe & Supply Co., P. O. Box 4185, Oklahoma City 9, Okla. Melrose 8-3369.

FOR SALE: Eight 6" OD x 2¼" ID x 30' Reed Drill Collars equipped with super shrunk grip connectors—very low footage. W. D. Kelley Estate, Pampa, Texas. Phone 2236 or 1108.

FOR SALE: 7500' 4½" 16.60# Sonoscoped Drill Pipe 4500' 3½" 13.30# Reg. Drill Pipe. 1—6" x 41' Square Kelly, Rotary, Cable Tool and production equipment. Giffin & Thompson Supply, Hoisington, Kansas. Phone 477.

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2—MODEL 6NK Waukesha with Ensign gas equipment, ICK Waukesha starting engine. These engines originally powered Wilson Giant Draw Works. Compound case and clutches have been removed but unit has extended base to accommodate compound case. Engines in good running condition. Serial Nos. 636983 and 636981. Complete price $4000.00. Western Services, Box 252, Mt. Carmel, Ill.

PRESSURE CONTROLLERS Climax 1400 pilots, with supply regulators; 60 to 1000# springs. $60.00 each, used. W. J. Stroud, Bel Oil Corp., Elton, La.

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Both Rigs Have
131' & 126' Lee C. Moore Masts with substructures, Diesel Twin 6 GMC's compounded, 214-P Oilwell mud pumps, 4½" drill pipe, shale shakers and mud pits. Operating currently West Texas. Complete inventory furnished upon request. Box 176, Salem, Illinois.

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EQUIPMENT FOR SALE

FOR SALE: 10,000'—4½" drill pipe, with tool joints cut off, located at Hobbs, New Mexico. Makin Drilling Company, Box 1626, Hobbs, New Mexico.

FOR SALE: 42 miles NEW 6⅝" 17.02 lb. .250" wall Kaiser Electric Weld Line Pipe, API-5L-Grade B, f.o.b. Denver at mill price. $1.45 foot. Stored in Denver in transit. Available today. Reason—changing our Good-All 40 mile pipe line from 6" to 8". Phone 889. Good-All Elec. Mfg. Co., Ogallala, Nebraska.

FOR SALE: C-150 National Pump—First-Class Condition. Meridian Drilling Co., Inc., 514 Liberty Bank Building, Oklahoma City, Okla. Telephone CE 2-2055.

ROTARY drilling rig, 300 Emsco, 6,200 ft. 4-in. drill pipe, 127-ft. mast. Good condition. Must sell. Keystone 7285, 1729 Stout St., Denver, Colorado.

FOR SALE: A complete Waukesha laboratory aviation supercharge test engine, ASTM designation D909-47T (3C), with adequate spare parts. Excellent condition. Substantial price saving. R. H. Armstrong, Republic Oil Refining Company, Texas City, Texas.

FOR SALE: Type 80 Cooper gas compressors. Good condition. Alfred B. Kern, 223 Wright Building, Tulsa, Oklahoma.

MODEL E563-42 Cooper well service unit, servicing to 6000 ft., skid mounted, 8x10x60' mast, excellent condition, $4,500.00. The Zeligson Company, Tulsa, Oklahoma. 8-4477. P.O. Box 5008.

FOR SALE at Roundup, Montana, a quantity of 7⅝" 26.4#, new, 8⅝" 32# new and used, and 36# new casing. Cities Service Oil, Patridge, Bartlesville, Oklahoma.

FOR SALE: 1—M318-32—Cooper Double Drum Winch w Cross Arm Spudder, including electric starting, air front controls, combination carburetor for gas, gasoline, & butane, and one 62 ft., 3 sheave heavy duty mast. Equipment mounted on 3 Ton International tandem truck. Williamson Well Service, Okmulgee, Okla. Phone 249.

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For sale by owner

Model "55" Failing, Truck Mounted. Truck or Draw Works motor available for hoisting power. Two section Mast with hydraulic lift and will stand doubles in derrick. Gardner-Denver Pump and Cummins Diesel Motor in one unit. Fuel Tanks, Oil House and Lite Plants on dual four wheel Trailer Substructure. Approx. 2400' 3½" Drill Pipe. Completely equipped for conventional contract drilling or may be stripped down for core drilling and day work.

Wilson Giant Draw Works with compound and Caterpillar Motors. Lee C. Moore Jackknife Derrick with Substructure. Gardner-Denver Pump drilled two wells. Approx. 4200' 4½" Drill Pipe. American Tool House New. Geologist Bunk House. Caterpillar Tractor.

These rigs are in full operating condition, having just completed wells and are not robbed of any material. Priced for quick sale. Write for itemized inventory. All inquiries answered.

H. J. UHL DRILLING CO.
Box 2336, North Station, Wichita, Kans.
Tel. Temple 8-3307

BARGAIN
SCREW GATE VALVES

10	2"	11½ thd 2000# Orbit CS
30	2"	3000#
20	3"	5000#
60	3"	3000#
2	3"	8V thd 1000# Kerotest J
2	3"	4000#
4	3"	8V thd 1600# Nordstrom Plug
4	4"	4000# Kerotest J

18,000 ft. ¾" Sucker Rods Gr. N 26' 28' Like New

STEEL PIPE • LARGE OD • HVY. WALLS • SCARCE SIZES

Write for our stock lists

Midcontinent Tube Service, Inc.
2308 OAKTON ST., EVANSTON, ILL.

EQUIPMENT FOR SALE

FOR SALE: 8500' good used ⅞" sucker rods for 20 cents per ft. Call or write James A. Shepard, Hoisington, Kansas. Phone 546.

IN GOOD CONDITION, JUMBO FORT WORTH SPUDDER, 185 HP Motor, Tools complete from 15" down. Practically new wire lines. Priced to sell. Contact Mrs. H. C. Knox, Tele. 547, Graham, Texas.

WANT EQUIPMENT: Did you find the equipment you wish to purchase in this column? If not, use an "Equipment Wanted" classified advertisement to find it. It is available somewhere and Journal classified advertisements will find it. See box heading for classified rates, or write The Oil and Gas Journal.

EQUIPMENT WANTED

WILL PAY highest prices for used casing, used line pipe, abandoned leases, or other surplus lease equipment. Your idle producing equipment is worth dollars. Green Pipe & Supply Co., Box 1383, Tulsa, Oklahoma.

NOTICE: We buy. We sell equipment everywhere. If you want to sell or buy, contact Pressey & Son, Pueblo, Colorado.

EQUIPMENT NOT IN USE: Did you find a buyer in this column for the equipment you have for sale? Someone wants it and an "Equipment For Sale" classified advertisement in the Journal will find a buyer. See box heading for classified rates or write The Oil and Gas Journal.
The Oil and Gas Journal.

HELP WANTED

OIL Industry Employment Service, 405 Tuloma Bldg., Tulsa, Okla. 4-5974. Tom Robinson, owner. For Technical and Trained Personnel, including LPG.

MAJOR DRILLING COMPANY has position in the U. S. for combination electrician-mechanic capable of working on electrical drilling rigs. Write Box G-673, The Oil and Gas Journal, Tulsa, Oklahoma, giving full particulars if interested.

PETROLEUM GEOLOGIST with about 10 years' experience in oil field mapping wanted for work on Staff of large producer. Duties include surface mapping within the Rocky Mountain Area.

Give references, details of education and experience, and salary expected in letter, and include photograph.

Box G-641, The Oil and Gas Journal, Tulsa, Oklahoma

FIELD ENGINEER

Mechanical or Chemical, with refinery experience to provide technical field service on installation and operation of furnaces and combustion equipment in the refining and chemical industries. Knowledge of instrumentation helpful. Must be personable and willing to travel. Please send complete resume giving age, education, experience, and salary history. Excellent opportunity for advancement. All replies strictly confidential.

PETRO-CHEM DEVELOPMENT COMPANY
Incorporated
122 East 42nd St., N. Y. 17, N. Y.

HELP WANTED

WANTED: Petroleum or Mechanical Engineers for oil tool design. Field experience desirable. State age, education, experience and salary expected. Box G-556, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEERS—Expanding chemical and fracturing service firm requires petroleum engineers under 30 for development and sales work. Limited experience acceptable. Firm is one of oldest in the business operating in Texas, Oklahoma, Louisiana, New Mexico and Kansas. Box G-652, The Oil and Gas Journal, Tulsa, Oklahoma.

INDEPENDENT COMPANY DESIRES Geologists—Geophysicists—Computers to be based in Oklahoma City. Qualified men who wish to advance themselves. Telephone Victor 3-1362 or write K. L. Spire, 7624 N. May Avenue, Oklahoma City, Oklahoma.

ENGINEER, not over 30, with some natural gas distribution system operating experience. Position is with a large natural gas company and requires substantial amount of travel by auto and ability to meet and associate with many people. In reply give complete data, including present salary, which will be held in confidence. Box G-661, The Oil and Gas Journal, Tulsa, Oklahoma.

SUBSURFACE GEOLOGIST

With degree in Geology and a minimum of 3 years' subsurface experience on deep wells. To work in Saudi Arabia on deep wells making lithologic and faunal logs from cores and cuttings, interpreting electrical logs and working on field and regional stratigraphic studies. Salary commensurate with experience and qualifications.

Write giving personal history and work experience. Please include telephone number.

RECRUITING SUPERVISOR
BOX OGJ

Arabian-American Oil Company

505 Park Avenue
New York 22, N. Y.

Rig manufacturer wishes to employ graduate engineer with 5 to 10 years oil field experience for sales promotion, advertising and production planning. Permanent and lucrative position to man who can produce. Reference and experience with first letter requested. Box G664, Oil and Gas Journal, Tulsa, Oklahoma.

HELP WANTED

MICROPALEONTOLOGIST

Preferably with an advanced degree and a minimum of 5 years' commercial or academic experience. To work in the New York research laboratory of a major oil company. This position demands broad interests in Stratigraphy and Biofacies and the capacity to do independent work on projects assigned. Salary dependent on experience and qualifications.

Write giving personal history and work experience. Please include telephone number.

RECRUITING SUPERVISOR
BOX OGJ

Arabian - American
Oil Company

505 Park Avenue

New York 22, N. Y.

THE POSITION YOU WANT: Oil industry companies are looking for men to fill every conceivable kind of position. If you didn't find the position in this column that you are looking for, use a "Situation Wanted" classified advertisement to state your qualifications. Some company is probably looking for your ability. See box heading for classified rates or write The Oil and Gas Journal

EXECUTIVE SALES ENGINEERS (3)

New York & Chicago Territories
Also one for National Travel

Will contact top executives personnel in petroleum & chemical industries, for refinery & chemical plant construction sales.

General knowledge of refining and chemical processes plus sales ability essential.

Rapidly expanding established organization operating nationally.

Send complete resume to
General Sales Manager

Box G-686, The Oil and Gas Journal, Tulsa, Oklahoma

ESTIMATORS

Young engineers capable of mechanical estimating for construction of refineries steam power and similar industrial projects. Must have some field experience Considerable weight given to ambition, intelligence and interest in estimating and cost analysis.

BECHTEL CORPORATION

220 Bush Street
San Francisco, California

HELP WANTED

FOREIGN EMPLOYMENT. List of oil companies and drilling contractors showing where to apply for foreign jobs. OIML Co., Box 2603, Tulsa, Okla. $5.00 cash.

VACANCIES for experienced Geologists in Indonesia and India Pakistan. Write Oil Industry Employment Service, 405 Tuloma Bldg., Tulsa, Okla. 4-5974.

MINING GEOLOGIST with 10-15 years experience wanted for work on Staff of large company. Duties include surface and sub-surface mapping, examination and evaluation of both metallic and non-metallic deposits, and supervision of general exploratory work within the Rocky Mountain Area.

Give references, details of education and experience, and salary expected in letter, and include photograph.

Box G-643, The Oil and Gas Journal, Tulsa, Oklahoma

PETROLEUM ENGINEERS

FOREIGN SERVICE

Graduate engineers with good background in general physics, mathematics, mechanics and with some laboratory experience in equipment and techniques. For laboratory position responsible for theoretical experimental studies on reservoir fluid and rocks. Duties will consist of designing equipment, performing or supervising, testing and analyzing and reporting results. Studies pertinent to evaluation of primary depletion practices and applicability of secondary recovery for pressure maintenance operation will be required.

Please write giving full particulars regarding personal history and work experience. Please include telephone number.

RECRUITING SUPERVISOR
BOX OG-5

Arabian - American
Oil Company

505 Park Avenue

New York 22, N. Y.

SITUATIONS WANTED

GEOLOGIST: 34 years old, married, 2 children, 11 years experience in geological and land work. Experienced to capably appraise, assemble, evaluate and direct all phases of exploration and development programs. Desires permanent and secure position with independent company. Location immaterial. Box 2034, Midland, Texas.

SALES ENGINEER: Experienced with Spudders, light Rotaries, and Air Blast Drills. Desires factory representative position. Box G-685, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPLORATION EXECUTIVE Geologist and Engineer, experienced direction exploration programs (geology, leasing, drilling, testing). Past experience Latin America and Mid-Continent last four years Kansas, age fifty, broad managerial experience. Box G-665, The Oil and Gas Journal, Tulsa, Oklahoma

HAVE five years management experience in fair size oil operation, including exploration, development, production, sale of oil, leases, contracts, etc. Have master's degree petroleum engineering and substantial geological experience. Desire position with small group or independent interested in oil exploration and production. Presently located Rocky Mountain area. Box G-683, The Oil and Gas Journal, P.O. Box 1260, Tulsa, Oklahoma.

SITUATIONS WANTED

EXECUTIVE Accountant—Office Management, taxes, insurance. Thoroughly experienced, under 40. Salary requirements $8,000.00. Confidential. Box G-674, The Oil and Gas Journal, Tulsa, Oklahoma.

CONTROLLER, Office Manager, General Manager desires responsible supervisory or administrative position with oil or gas company. Nineteen years' diversified experience with independent producing and drilling companies. Accounting and tax background. References. Mid forties, married, will relocate. Box G-678, The Oil and Gas Journal, Tulsa, Oklahoma.

OIL ACCOUNTANT—Office Manager. College training, five years experience. Capable administrator, financial statements, taxes, all phases of accounting. Box G-668, The Oil and Gas Journal, Tulsa, Oklahoma.

MANUFACTURERS AGENT, interested in production and drilling equipment accounts. Territory consisting of South Louisiana and Mississippi. Warehousing space available. Headquarters Harvey, La. Write Box 102, Harvey, Louisiana.

GEOLOGIST—Single, 25. 2½ years' experience in subsurface geology, 1 year reservoir engineering. Willing to go anywhere. Write 116A, 8th Avenue East, Calgary, Alberta, Canada. Phone 6-2764.

SCOUT—30, family, college degree, 6 years' experience production and crude-oil scouting work. Desire return to southwest. Box G-679, The Oil and Gas Journal, Tulsa, Oklahoma.

CHEMICAL ENGINEER: Four years of design and other engineering experience in natural gas dehydration, desulfurization, absorption and transmission work. Desires permanent position with progressive organization. Box G-677, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER: B.S. Degree, 10 years' experience in production, drilling, and reservoir engineering. 8 years with major oil company, 2 years with small independent. Age 33. Desires position with either major or independent oil company anywhere in U.S.A. or Canada. Above average academic and professional background. Complete resume upon request. Box G-680, The Oil and Gas Journal, Tulsa Oklahoma.

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas, and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No. 1628, Ph. No. 3-3141, Hobbs, New Mexico.

GEOLOGIST, 14 years experience all phases petroleum geology (lease evaluation, appraisal, exploration and development). Regional and Detail subsurface experience in Gulf Coast, Mid-Continent, West Texas, Rocky Mountain and Foreign Areas. Some administrative duties desirable. Location open. Box G-650, The Oil and Gas Journal, Tulsa, Oklahoma.

LANDMAN—Legal training and 7 years experience major company office and field. Desires change to expanding independent. Can relocate and travel. Box G-675, The Oil and Gas Journal, Tulsa, Oklahoma.

PATENT LAWYER, late thirties, wanting additional responsibility, seeks to manage patent and related phases of corporate activity. Proven administrative ability. Background includes industrial, chemical, petrochemical, engineering and Washington experience. Excellent references. Replies held confidential. Box G-682, The Oil and Gas Journal, Tulsa, Oklahoma.

CHEMICAL AND GAS ENGINEER: 33 years old, single, M.S. in chemical and gas technology. (Institute of Gas Technology). Five years experience in chemical, four in natural gas industry. Chemical research, Supervisory experience. All phases of natural gas design, FPC reports and testimony. Economic studies. Know accounting. Technical articles published. Box G-684, The Oil and Gas Journal, Tulsa, Oklahoma.

THE RIGHT MAN: Can you fill the position you have open from the qualifications listed in this column? Men are always looking for an opportunity to improve themselves. Use a "Help Wanted" Journal classified advertisement to find the men you need. See box heading for classified rates or write The Oil and Gas Journal.

ROYALTIES

WORLD'S LARGEST REGION for gas-oil condensate reserves and expectant oil fields, inquire for opportunities therein. A. S. Berry, P. O. Box 1383, Tulsa, Oklahoma.

PRODUCING ROYALTY and overrides for sale. Wire-write-call for particulars. JACK EAGLE, 706 City Natl. Bldg., Okla. City, Okla. REgent 6-7027.

GET TOGETHER: Both Capital and Royalties are available. If the investment proposition you want isn't listed in this column, use a Journal classified advertisement to find it. See box heading for classified rates, or write The Oil and Gas Journal.

LEASE AND DRILLING BLOCKS

SEISMOGRAPHED BLOCKS
Logan and Noble Counties, Okla. Good Wilcox prospects and shallower sand possibilities. Will give attractive deal to responsible operators. Arthur Davidor, 1412 NW 38th St., Oklahoma City.

WANTED: Settled production approx. 1,000 bbl. daily, with additional acreage on which wells can be drilled. Stauffer, 108½ E. Grand River, Howell, Michigan.

FOR SALE: 160 acres, 12-year-old lease. Settled production 200 bbl., approximately $250,000.00 physical inventory. A dozen different pays—great possibilities. Must be a bonafide company. Major company preferred. Box G-681, The Oil and Gas Journal, Tulsa, Oklahoma.

INVEST in carefully selected U. S. Govt. oil leases. 60c/acre. Minimum 640 acres. Small override to broker. Box 2835, Denver, Colorado.

WILL pay cash instantly for leases (large blocks), royalties, mineral deeds, production. Write fully—P. O. Box 2153, Denver, Colorado.

SEE A. L. Bowles, Rollow Building, Ada, Oklahoma, for drilling deals.

MAKE ME A DEAL TO DRILL—Have 16,000 Acres under lease in Rawlins County, Kansas. Will Farm Out Part on Drilling Deals. F. W. Vishnefske, Salina, Kansas.

LOOKING FOR A LEASE? There will be over 40,000 wells drilled this year. If you are looking for a lease, drilling block, or drilling deal and haven't found it in this column, or if you have a lease or drilling block you want drilled, a Journal classified advertisement can find an interested party. See box heading for classified rates, or write The Oil and Gas Journal.

LEASES ROYALTIES
Producing and Nonproducing
Bought and Sold—Any Area
Inquiries Invited
B. D. BUCKLEY
6635 Delmar Ave., St. Louis 5, Mo.

BUSINESS OPPORTUNITIES

INVENTER of processes for tetraethyl lead gasoline antiknock material with issued patents, seeks party for financing and organizing business to refiners. G. F. Ruddies, 5646 Sheridan Road, Chicago, Ill.

BUSINESS OPPORTUNITY

Going business for sale. Completely equipped oil field machine shop and pipe and supply business. Seventeen acres on U. S. Highway.

E. CUTSINGER MACHINE CO.
Seminole, Oklahoma
Phone 1127

MAILING LISTS

MAILING LISTS of the oil industry. Our 30th year. Send for catalogue. Oil Industry Mailing List Co., 405 Tuloma Bldg., Tulsa, Okla.

ELECTRICAL CONTRACTORS

Office Phone	Res. Phone
5-5315	7-4950

W. L. RATCLIFF COMPANY
ELECTRICAL CONTRACTORS
Industrial—Commercial—Distribution

W. L. Ratcliff	506 Caddo St.
P. O. Box 373	Shreveport, La.

FINANCING

YOUR FINANCING PROBLEM can most probably be solved. Inquiries invited. Address: Box G-617, The Oil and Gas Journal, Tulsa, Oklahoma.

REAL ESTATE

SPACE IS NEEDED: A Journal display classified advertisement is the quickest way to rent or sell your real estate. In the present period of expansion oil industry firms urgently need the space you have available. If it isn't listed here, you may also find it by stating your needs in these pages. For classified rates see box heading or write The Oil and Gas Journal.

OFFICE SPACE

FOR RENT in Fort Worth, Texas, 1100 square feet in modern centrally located downtown office building. Includes large newly decorated private office. Will also consider leasing part of office space and share reception room. Box G-676, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR RENT OFFICE SPACE

OFFICE SPACE FOR RENT

Six thousand square feet of office space, second floor, steel and reinforced concrete building, Miles City, Montana. Excellent schools, hospitals, etc., housing situation not extreme. Two transcontinental railroads, licensed airport, road center north and south. The best community for your branch or district office. H. C. Smith, 4601 Market Street, Philadelphia. Phone GR 4-7000.

AERIAL PHOTOGRAPHY

GOVERNMENT AERIAL PHOTOGRAPHY for exploration, etc. Our integrated services of personal search reporting, prepaid orders, and delivery follow-up often save you a month's costly delay in difficult, unsatisfactory correspondence with numerous gov't agencies on procurement of inexpensive stereo prints, mosaics, etc. U.S. air coverage divided among various agencies each operating separately. Fees quoted on your job based on work required. Original gov't. prepayment receipts furnished, prints shipped direct. Searches for ready-made foreign air photography also made. **Write Dept. OGJ.**
WASHINGTON COMMERCIAL CO.
1200 15th St. N.W., Washington 5, D.C.

EQUIPMENT MEN

Merle G. Decker Joins Spang & Co. Sales Force

Merle G. Decker, Marietta, Ohio, recently joined the sales force of Spang & Co., Butler, Pa.

Decker comes to Spang from Acme Fishing Tool Co., for whom he has acted as sales representative since 1937. Decker is experienced in the drilling business, having been with Ohio Fuel Gas Co. as driller and tool pusher for 15 years.

Buckeye to Distribute Carter Hydraulic Units

S. C. Carter Co., Inc., Los Angeles manufacturers of the Carter long-stroke hydraulic pumping unit, has announced the appointment of The Buckeye Supply Co. as distributors for West Virginia.

Buckeye Supply will handle sales and service of the Carter units from its head office at Zanesville, Ohio.

Girdler Co. Names Huber to Votator Division Sales

John E. Slaughter, Jr., vice president of The Girdler Co., Louisville, has announced the appointment of Harold E. Huber as a member of the technical sales department of the firm's votator division.

Huber began his business career with Standard Oil Co. of Indiana in 1938. He was engaged in exploratory research and pilot-plant work before joining Girdler in 1943. Prior to being elevated to his present position he was chief process engineer of the votator division.

The Girdler Co. is a division of National Cylinder Gas Co.

Roberts is Promoted by By B. F. Goodrich Co.

Harry N. Roberts has been appointed manager of B. F. Goodrich brand petroleum company tire sales for the B. F. Goodrich Co. Tire & Equipment Division. He was formerly of battery and spark-plug sales.

Roberts, a graduate of University of Pittsburgh, joined B. F. Goodrich in 1935 as a wholesale salesman in the Cleveland district. He became wholesale sales supervisor in 1939, general sales supervisor in 1941, and in 1942 was transferred to the truck-tire sales department in Akron. In 1946 Roberts was made manager of battery and spark plug sales, a position he retained until his present assignment.

C. S. Beard Joins Foster Engineering Staff

C. S. BEARD

Chester S. Beard, instrument engineer, has joined Foster Engineering Co., Union, N. J., it has been announced by Herman Rodewald, vice president of Foster.

Before joining Foster, Beard was with Ebasco Services, Inc., specializing in pipe-line and process instrumentation. He had previously headed instrument groups for Bechtel Corp., Southern California Gas Co., and Permanente Metals Corp., following many years in casing-head plants and refineries in the oil fields of California.

Parsons Co. Offers Fluid Coking Process

The Ralph M. Parsons Co. has been selected by Standard Oil Development Co. to offer the fluid coking process to the petroleum industry.

Parsons' services cover process design, engineering, and construction for complete plants utilizing the process.

Fluid coking produces a low-volatility coke and excellent cracking stock with high liquid recovery.

Askania Regulator Names Eads Company

Askania Regulator Co., Chicago, has announced the appointment of Ralph Eads, Jr., of the Eads Co., Houston, as Askania representative in Texas and Louisiana.

Eads succeeds Dean D. Ault, of Houston, recently deceased.

WILDCAT COMPLETIONS

(Continued from page 185)

Daniel Manuel, NW NE NE 32-7n-54w. Dry. TD 5,253 ft.

Willets & Craig 1 Condon, SW SW SE 35-10n-50w. Dry. TD 4,152 ft.

White Eagle Oil Co. 1 State, SW NE SW 9-8n-50w. Dry. TD 4,596 ft.

British-American "C"-1 State, NE NW NE 10-10n-53w. Dry. TD 5,193 ft.

Sedgwick County: Stanolind Oil & Gas Co. 1 Gibson, NW NE SW 19-11n-46w. Dry. TD 3,686 ft.

Weld County: C. G. Glasscock, James P. Sloss 1 Gradbury, NE NE NW 15-9n-58w. Dry. TD 7,813 ft.

Yuma County: Quintana Production Co. 1 Stulp, SW SE NW 4-2s-47w. Dry. TD 3,440 ft. "J" sand 3,376 ft.

SASKATCHEWAN

British American-Husky-Phillips 1 Cedoux, LSD 8, 10-11-14w2. Dry. TD 3,999 ft.

Socony-Woodley-Southern Crown 21-4 Lake, LSD 4, 21-14-22w3. Dry. TD 3,418 ft.

Amurex-Albercan 1-4 Frank, LSD 4, 3-16-27w3. Jurassic oil well. TD 3,485 ft.

Shell Oil Co. 6-14 Ibson Lake A, LSD 6, 14-9-18w2. Dry. TD 4,457 ft.

J. P. Owen-Socony 1 Little Black Bear, LSD 2, 29-23-10w2. Dry. TD 3,350 ft.

Sun-Christie 1-3 Meyronne, LSD 1, 3-8-7w3. Dry. TD 5,280 ft.

Plymouth-Sun 1 Osage, LSD 9, 30-11-12w2. Dry. TD 4,518 ft.

Tide Water 3 Parkbeg Crown, LSD 11, 14-17-3w3. Dry. TD 4,285 ft.

Potash Co. of America 3 Saskatoon, NE¼ LSD 16, 26-36-4w3. Dry. TD 3,708 ft.

Shell Oil Co. 8 Wood Mountain, LSD 13, 30-2-11w3. Dry. TD 4,275 ft.

ALBERTA

Rio-Prado 13-22 Burdett, LSD 13, 22-10-12w4. Ellis sand oil well. TD 3,013 ft.

Dome 11-23 J. V. Consort, LSD 11, 23-37-5w4. Viking sand gas well. TD 2,358 ft.

Western-Redwater-Merrill 12-29 Calvan, LSD 12, 29-34-10w4. Viking sand oil well. TD 2,977 ft.

Richfield Oil Corp.-CPR 6-23 Hardisty, LSD 6, 23-42-12w4. Dry. TD 3,272 ft.

Union 14-34 Robson, LSD 14, 34-43-14w4. Dry. TD 4,285 ft.

Sinclair Crown 1 Baxandall "V," LSD 4, 8-60-1w5. Viking sand gas well. TD 2,685 ft.

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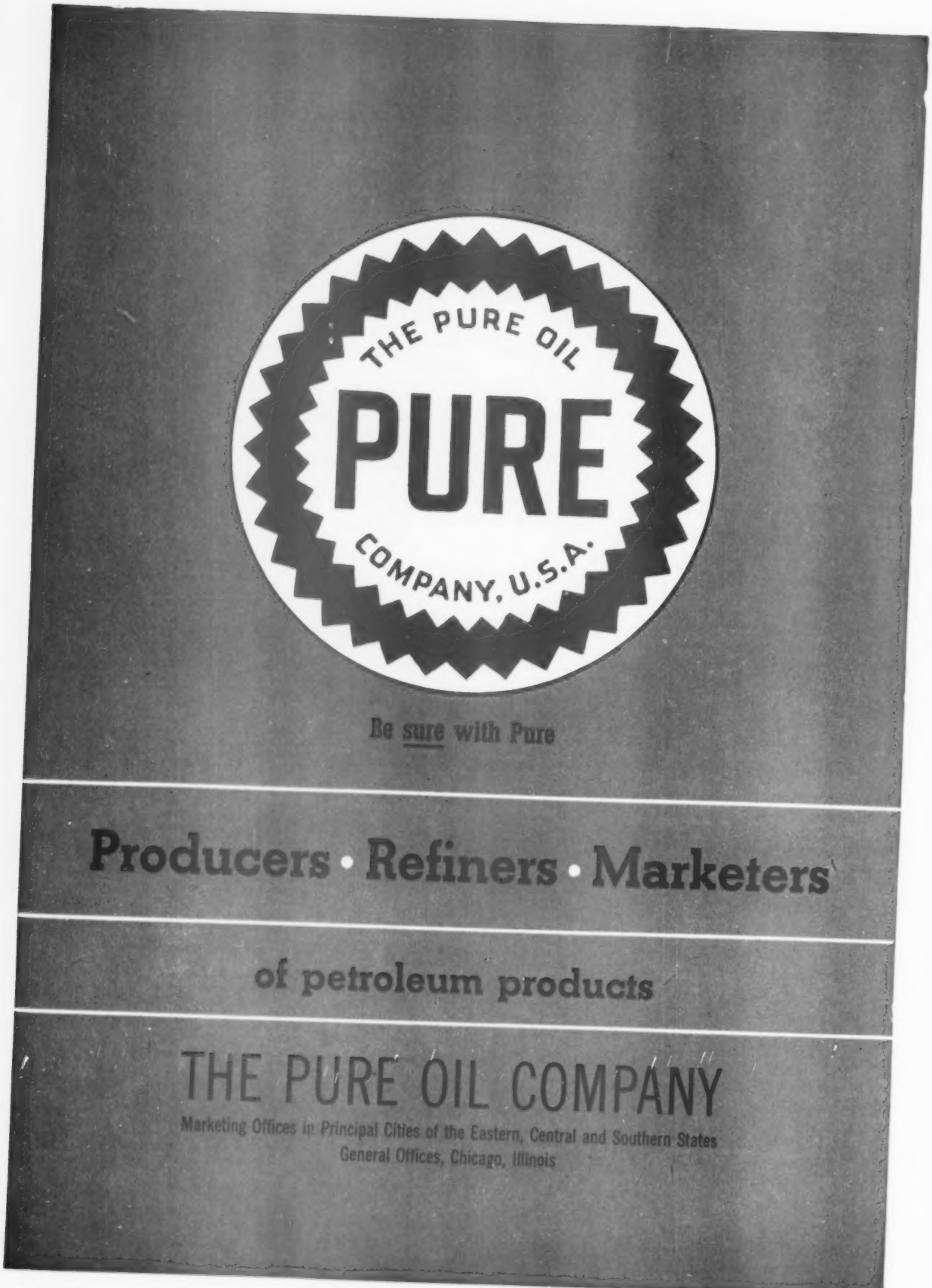
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PURE
COMPANY, U.S.A.
Be sure with Pure
Producers • Refiners • Marketers
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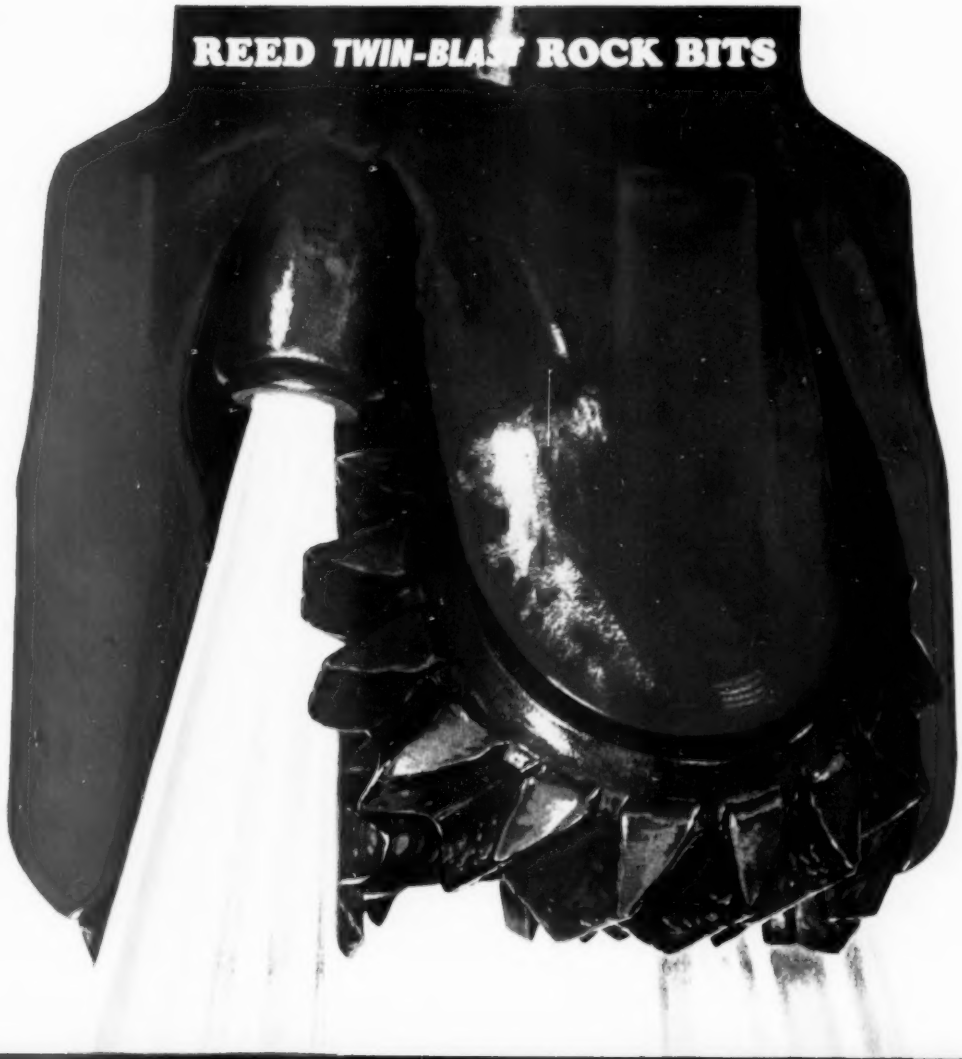
General Offices, Chicago, Illinois

REED *TWIN-BLAST* ROCK BITS



These TWIN BLASTS . . .

. . . blast cuttings from the bottom of the hole!

Slush from the nozzles of a **REED** Twin-Blast Rock Bit blasts against the bottom of the hole and sweeps across at high velocity—carrying cuttings up into the mud stream immediately so cutter teeth can work on new formation.

Result: larger cuttings, faster drilling, more footage per bit and more hole per day, as proved in use on wells throughout the world.

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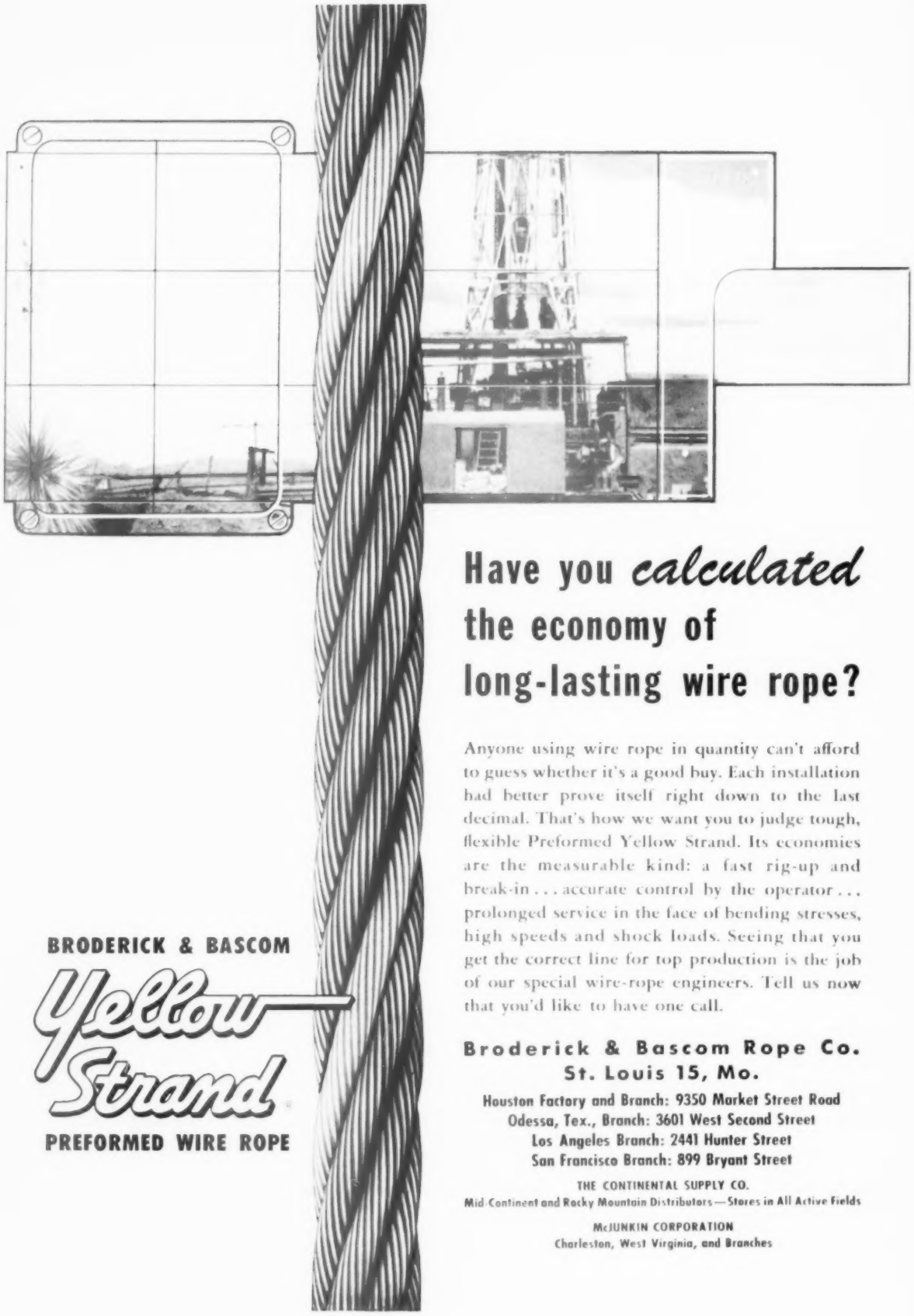

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